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Volume XI

V. L. Komarov, Editor

Papilionatae, Caesalpinoideae, Mimosoideae

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(Flora SSSR)

Volume XI

Papilionatae, Caesalpinoideae, Mimosoideae

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Addenda — Descriptiones plantarum novarum in tomo XI Florae URSS commemoratarum

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PREFACE

The Second World War against Hitlerite Germany, which treacherously attacked the USSR, inspired patriotic feeling throughout the Soviet nation. The botanists of the Soviet Union, whether on active service or engaged in some other defensive task, all took part in this struggle.

Although some authors have joined the Red Army and the People's Volunteer Corps, the Editors of the "Flora" have undertaken to carry on the processing of the "Flora" for publication, and thus Volume XII is due to go to press in the near future.

Volume XI of the "Flora of the USSR" contains descriptions of some of the principal genera of the large and economically exceedingly important family of Leguminosae. The family as a whole occupies three volumes, the next volume being taken up exclusively by the genus Astragalus, while the remaining genera are contained in Volume XIII. Following the extension of USSR territory by the inclusion of new republics, two new regions have been added to the earlier ones: the Baltic region, comprising the Estonian, Latvian, and Lithuanian Soviet Socialist Republics, and the Upper Dniester region, including the western Ukraine and the part of Bukovina incorporated in the USSR. The Moldavian SSR has been included in the Bessarabian region.

For space saving purposes, some new abbreviations have been added in Volume XI, to denote some frequently recurring terms, such as standard, keel, or wings, and a revised list of abbreviations has been compiled.

The number of authors taking part in the composition of Volume XI exceeds that of any of the preceding volumes, and amounts to a team of 16 people. The volume contains genera of practical importance such as clover and alfalfa. The treatment of clovers has been contributed by E. G. Bobrov, who revised to a considerable extent the systematics of the genus as a whole. The treatment of the genus Medicago was supplied by A. A. Grossheim, who has long been working on the taxonomy of our medicks.

A completely new treatment of the genus Caragana has been presented by A. I. Poyarkova, as vast new material has accumulated since the publication of Komarov's classical monograph of this genus; thus, within a more extensive framework, an entirely new approach to the systematic problems of the genus has been made possible.

The smaller but difficult genera Cytisus and Genista have been treated by V. I. Krechetovich and B. K. Shishkin, respectively.

The present volume contains descriptions of 325 numbered species and a considerable number of cultivated (unnumbered) species.

The Editors

Family LXXVIII. **LEGUMINOSAE** JUSS.

Flowers with biseriate perianth, zygomorphic, rarely actinomorphic, bisexual or very rarely unisexual by abortion; sepals 5 or 4, more or less united, rarely distinct, the calyx sometimes bilabiate; petals 5 (4), rarely fewer or absent (Ceratonia), distinct or all connate in lower part (Trifolium) or partially united; perianth very often papilionaceous; upper posterior petal, the standard, usually larger and broader than the rest, mostly unguiculate, rarely sessile; other petals always more or less clawed, the 2 lateral ones called wings, the 2 anterior coherent or basally connate into a keel enclosing the stamens and pistil; stamens 10, diplostemonous, or 5, rarely numerous, commonly inserted on the margin of a disk, free or their filaments united into a tube, often diadelphous by separation of the posterior stamen from the remaining 9; anthers basifixed or dorsifixed, dehiscing by longitudinal slits or rarely by apical pores (Cassia); pistil 1; ovary superior, sessile or stipitate, unilocular or spuriously bilocular or rarely with cross-divisions; style simple, with capitate or oblique often lateral stigma; ovules numerous, in 2 rows on posterior ventral suture, anatropous or amphitropous, ascending or pendulous, with 1 or 2 integuments; fruit a legume, usually many-seeded, dehiscing by 2 valves or sometimes breaking up transversely into 1-seeded articles, rarely 1-seeded and then mostly indehiscent; seeds exalbuminous or with very scant endosperm. Perennial or less frequently annual herbs, sometimes twining, undershrubs or shrubs, rarely trees or climbers; roots commonly with nodules containing nitrogen-fixing bacteria; leaves alternate, stipulate, pinnate or imparipinnate (rarely bipinnate) or palmatipartite, rarely undivided or reduced; flowers in terminal or axillary racemes, rarely in panicles, cymes or heads, rarely solitary.

Note. The Leguminosae are one of the largest families, containing up to 12,000 species distributed almost throughout the world. About 1,700 species of this family grow in the USSR.

Rather few leguminous fossils are known and some of these have only been roughly identified. The compound leaves or their parts are sufficiently characteristic to enable identification of plants as leguminous, but in many instances no more precise determination can be secured because of insignificant differentiation of foliar parts. Similarly, the pods, though easily recognizable as fruits of Leguminosae, do not lend themselves to more exact identification. Thus, some indubitable representatives of this family are simply identified as Leguminosites, Papilionacea, etc.

Taenioxylon porosum Felix, in Oligocene (Maikop) deposits of E. Transc. (Apsheron Peninsula).

Leguminosites mandschuricus Heer in Tertiary Paleogenic deposits of Uss. (Pos'et). — L. rogowiczii Schmalh. in the Eocene of M. Dnp. (Kiev). — L. feofilaktovii Schmalh. in the Eocene of M. Dnp. (Kiev). — Leguminosites sp. in Tertiary deposits of Ar.-Casp. (location not indicated).

Papilionacea sp. in Sarmatian formations of Bl. (Orekhov).

Leguminosae in Sarmatian formations of Bl., Krynka.

Key to Genera

1. Leaves simple or much reduced, soon deciduous, or wanting and replaced by phyllodes . . . . 2.
+ Leaves compound, pinnate, ternate, or palmatipartite . . . . 17.
2. Trees, shrubs, or undershrubs . . . . 3.
+ Herbaceous plants . . . . 11.
3. Leaves obsolescent or replaced by phyllodes . . . . 4.
+ Leaves with developed blade . . . . 6.
4. Trees with phyllodes replacing leaves . . . . ***Acacia** L.
+ Shrubs . . . . 5.
5. Densely spinous shrubs (naturalized in W. Transc.) . . . . ***Ulex** L.
+ Unarmed arenarious shrubs . . . . 800. **Eremosparton** Fisch. et Mey.
6. Leaves reniform or suborbicular; flowers red, appearing before leaves . . . . 772. **Cercis** L.
+ Leaves differently shaped or, if suborbicular, then flowers yellow . . . . 7.
7. Flowers blue or lilac, rarely white . . . . 8.
+ Flowers yellow; legume not articulate . . . . 9.
8. Plants spiny in leaf axils; fruit articulate . . . . 820. **Alhagi** Desv.
+ Plants unarmed; fruit inflated, not articulate . . . . 802. **Smirnovia** Bge.
3 9\. Leaves large, broad-ovate, to 3 cm broad (Central Asia) . . . . 778. **Piptanthus** D. Don.
+ Leaves lanceolate or ovate, not more than 2 cm broad . . . . 10.
10. Calyx with 5 equal teeth . . . . 782. **Spartium** L.
+ Calyx bilabiate . . . . 783. **Genista** L.
11. Leaf blade wanting; a pair of stipules or much enlarged petiole strongly developed . . . . 826. **Lathyrus** L.
+ Leaf blade present . . . . 12.
12. Stem developed . . . . 13.
+ Acaulescent plants . . . . 16.
13. Pods prickly, curved . . . . 813. **Scorpiurus** L.
+ Pods without prickles, not curved . . . . 14.
14. Pods glandular-hairy . . . . 788. **Ononis** L.
+ Pods densely pubescent but eglandular or else glabrous . . . . 15.
15. Fruit indehiscent; leaves more or less toothed . . . . 798. **Psoralea** L.
+ Pods dehiscent; leaves entire . . . . ***Crotalaria** L. (C. juncea L.).
16. Pod usually with spurious septum; valves not spirally coiled . . . . 809. **Astragalus** L.
+ Pod without septum; valves spirally coiled . . . . 808. **Gueldenstaedtia** Fisch.

17. Leaves 3- or 5-foliate . . . . 18.

+ Leaves pinnate, usually with many pairs of leaflets, rarely with 1 pair . . . . 54.

18. Leaves 3-foliate . . . . 19.

+ Leaves digitate, 5- or rarely 7—9-foliate . . . . 49.

19. All the 10 stamens free . . . . 779. **Thermopsis** R. Br.

+ All the stamens united or 9 united and 1 free . . . . 20.

20. All stamens united; flowers never in heads . . . . 21.

+ Androecium of 9 united stamens and 1 free . . . . 28.

21. Leaflets mostly toothed and more or less glandular-pubescent; the terminal leaflet with longer petiolule than the lateral ones; 5 calyx teeth equal; pods often glandular-hairy . . . . 788. **Ononis** L.

+ Leaflets entire, often more or less silky-pubescent, the terminal leaflet not differing from the lateral ones; calyx distinctly 2-lipped; pods glabrous or covered with simple hairs . . . . 22.

22. Racemes pendulous; pods stalked, with thickened or winged sutures; seeds without caruncle . . . . ★**Laburnum** Griseb.

+ Racemes erect or spreading, but not pendulous; pods sessile, not thickened at sutures; seeds mostly caruncIulate . . . . 23.

23. Calyx teeth much longer than tube; seeds without caruncle; undershrubs . . . . 781. **Argyrolobium** Eckl. et Zeyh.

+ Calyx teeth shorter to but slightly longer than tube; seeds caruncIulate; shrubs, rarely undershrubs . . . . 24.

24. Leaflets deciduous; style spiral . . . . 787. **Sarothamnus** Wimm.

+ Leaflets persistent; style not coiled . . . . 25.

25. Flowers in erect long-peduncled racemes . . . . 785. **Lembotropis** Griseb.

+ Flowers in few-flowered clusters . . . . 26.

26. Upper calyx-lip broad, 4-toothed to about the middle; lower lip consisting of a single short subulate tooth . . . . 780. **Lotononis** Eckl. et Zeyh.

+ Upper calyx lip 2-toothed; lower lip 3-toothed . . . . 27.

27. Calyx teeth equaling or slightly longer than tube . . . . 784. **Teline** Medik.

+ Calyx teeth much shorter than tube . . . . 786. **Cytisus** L.

28. Stem twining or if not so then leaflets large (to 4 cm or longer), each with a stipel at base (mostly cultivated plants) . . . . 29.

+ Stem always erect, sometimes very short; leaves mostly not more than 3 cm long . . . . 34.

29. Inflorescence a raceme with thickened nodes . . . . 30.

+ Inflorescence mostly a few-flowered cyme or a very short raceme, not thickened at nodes . . . . 33.

30. Hilum about one-quarter length of seed; caruncle weak, often obsolescent . . . . 31.

+ Hilum greatly exceeding half length of seed; caruncle prominent . . . . ★**Dolichos** L.

31. Keel spirally coiled; hilum ovate, not prominent . . . . . ★**Phaseolus** L.

+ Keel slightly hooked at tip, not coiled . . . . 32.

32. Style bearded along inner side; odd stamen quite free . . . ★**Vigna** Savi.

+ Style glabrous; odd stamen united with staminal tube to the middle . . . . ★**Pueraria** DC.

5 33. Flowers 5 – 8 mm long, pale violet; pods hairy . . . . . . 829. **Glycine** L.
+ Flowers large, white or violet; pods glabrous except for bristly-bearded sutures . . . . 828. **Falcata** Gmel.
34. Petals adnate to staminal tube, marcescent, very rarely caducous . . . . 792. **Trifolium** L.
+ Petals free, caducous, very rarely persistent . . . . 35.
35. Leaflets entire . . . . 36.
+ Leaflets more or less toothed . . . . 43.
36. Calyx teeth equaling the standard or nearly so; flowers in dense heads . . . . 818. **Hedysarum** L. (H. plumosum Boiss.).
+ Calyx teeth shorter than standard; flowers in a rather loose racemiform or spiciform inflorescence or solitary . . . . 37.
37. Ovary and pod covered with appressed or spreading hairs . . . . 38.
+ Ovary and pod glabrous, sometimes prickly . . . . 39.
38. Pod elongate, the valves coiling at maturity. . . . . 807. **Chesneya** Lindl.
+ Valves not coiling or, if slightly coiling, then pod shorter . . . . 809. **Astragalus** L.
39. Plants chaffy-glandular; pods prickly . . . . . 812. **Meristotropis** Fisch.
+ Plants without glandular indument; pods not prickly . . . . 40.
40. Pods on a long exserted stalk . . . . 821. **Desmodium** Desv.
+ Pods sessile . . . . 41.
41. Stipules resembling leaflets, hence leaves apparently 5-foliate; all flowers allogamous . . . . 795. **Dorycnium** Mill.
+ Stipules differing from leaflets; some of the flowers cleistogamous . . . . 42.
42. Shrubs or perennial herbs . . . . 822. **Lespedeza** Rich.
+ Annuals . . . . 823. **Kummerovia** Schindl.
43. Petals blue, purple or violet, rarely whitish . . . . 44.
+ Petals yellow or rarely pure white . . . . 47.
44. Pod 1-seeded . . . . 798. **Psoralea** L.
+ Pod 2 – many-seeded . . . . 45.
45. Petiolules very short, equal;* petals persistent . . . . 792. **Trifolium** L.
6 + Petiolules of lateral leaflets very short; terminal petiolule rather long; petals caducous . . . . 46.
46. Leaflets toothed only at apex; inflorescence rather long; pod beakless . . . . 790. **Medicago** L.
+ Leaflets toothed all along the margin or rarely subentire; inflorescence spherical or ovoid; pod beaked . . . . . 789. **Trigonella** L.
47. Flowers small, pendulous, in loose elongate racemes . . . . 791. **Melilotus** L.
+ Flowers in pairs, rarely solitary or in short racemes or umbelliform inflorescence . . . . 48.
48. Pods falcate or cochleate, rarely reniform; inflorescence pedunculate . . . . 790. **Medicago** L.
+ Pods linear, slightly curved; inflorescence without peduncle . . . . 789. **Trigonella** L.

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* In T. campestre Schreb. the terminal leaflet is at a distance of 3 – 7 mm from the lateral ones and its petiolule thus appears to be longer.

49. Stamens monadelphous; leaflets 5 – 7. . . . . ★ **Lupinus** L.

+ Stamens diadelphous . . . . 50.

50. Keel with beak mostly one-fifth to one-fourth its length . . . . 51.

+ Keel beakless or obsoletely beaked . . . . 52.

51. Inflorescence solitary, more than 2 cm long; style thickened at summit; pod with 4 herbaceous wings . . . . . 797. **Tetragonolobus** Scop.

+ Inflorescence few-flowered, capitate, not more than 1.5 cm long; style dilated at summit; pod wingless . . . . 796. **Lotus** L.

52. Flowers yellow; inflorescence not capitate; shrubs . . . . 805. **Caragana** Lam.

+ Flowers of different color; inflorescence capitate; herbs or undershrubs . . . . 53.

53. Corolla 14 – 16 mm long; leaflets sharply serrulate . . . . 792. **Trifolium** L.

+ Corolla 4 – 7 mm long; leaflets entire . . . . 795. **Dorycnium** Mill.

54. Leaves, at least the upper ones, bipinnate; trees or shrubs . . . . . . 55.

+ Leaves simply pinnate . . . . 59.

55. Stamens numerous . . . . 56.

+ Stamens not more than 10 . . . . 57.

56. Stamens connate in lower part into a tube; corolla actinomorphic; petals connate to the middle . . . . 770. **Albizzia** Durazz.

+ Stamens and petals distinct . . . . ★**Acacia** Willd.

57. Flowers bright red or orange, in umbelliform clusters at ends of branches; unarmed . . . . ★**Caesalpinia** L.

+ Flowers of different color, in elongate racemes; spiny trees or undershrubs . . . . 58.

58. Undershrub to 40 cm high; pod fleshy, inflated, to 5 cm long . . . . 771. **Lagonychium** M. B.

+ Tree to 40 m high; pod linear-oblong, flat, 20 – 40 cm long . . . . 773. **Gleditschia** L.

59. Leaves paripinnate . . . . 60.

+ Leaves imparipinnate . . . . 75.

60. Shrubs or trees . . . . 61.

+ Herbaceous plants . . . . 69.

61. All stamens distinct . . . . 62.

+ Stamens diadelphous . . . . 63.

62. Evergreen tree; flowers polygamo-dioecious; stamens of male flowers 5 . . . . ★**Ceratonia** L.

+ Deciduous shrub; flowers bisexual; stamens 10 . . . . 776. **Ammodendron** Fisch.

63. Petals yellow . . . . 64.

+ Petals of different color . . . . 66.

64. Flowers in many-flowered racemes . . . . 806. **Calophaca** Fisch.

+ Flowers solitary or in axillary clusters . . . . 65.

65. Stipules spineless, often scarious; leaf rachises spinescent, persistent as spines after shedding of leaflets . . . . 809. **Astragalus** L.

+ Stipules spinescent or herbaceous and then leaf rachises not turning into spines . . . . 805. **Caragana** Lam.

66. Pods on a stalk exceeding calyx . . . . 804. **Halimodendron** Fisch.
+ Pods sessile or nearly so . . . . 67.
67. Keel point-tipped . . . . 810. **Oxytropis** L.
+ Keel muticous . . . . 68.
68. Pod dehiscent, containing several seeds . . . . 809. **Astragalus** L.
+ Pod indehiscent, 1-seeded; corolla purplish violet . . . .
. . . . 819. **Onobrychis** Gaertn.
69. Plants glandular-hairy . . . . 824. **Cicer** L.
+ Plants glabrous or hairy, not glandular . . . . 70.
70. All stamens distinct; 3 of the 10 stamens usually imperfect . . . . .
8 . . . . ★**Cassia** L.
+ Stamens diadelphous . . . . 71.
71. Style glabrous; pods maturing underground . . . . ★ **Arachis** L.
+ Style hairy at summit; pods not maturing underground . . . . 72.
72. Calyx teeth several times length of tube; stem never winged; pods
1 – 3-seeded. . . . . ★ **Lens** Gren. et Godr.
+ Calyx teeth shorter to scarcely longer than tube or, if occasionally
much longer, the stem distinctly winged . . . . 73.
73. Stipules larger than leaflets, ovate-cordate; petals never yellow
. . . . 827. **Pisum** L.
+ Stipules smaller than leaflets, mostly semihastate or, if stipules
large, petals yellow . . . . 74.
74. Leaflets mostly plicate in the bud; stipules often glandular-spotted,
with large teeth in many species; staminal tube oblique at orifice;
style filiform, never coiled . . . . 825. **Vicia** L.
+ Leaflets mostly convolute in the bud, glandular; stipules not large-
toothed; staminal tube straight at orifice; style often more or less
compressed, in many species twisted . . . . 826. **Lathyrus** L.
75. Trees or tall shrubs . . . . 76.
+ Low shrubs, sometimes climbers, undershrubs, or herbs . . . . 78.
76. Stamens connate only at base . . . . 77.
+ Stamen diadelphous . . . . ★ **Robinia** L.
77. Petals yellow; flowers in panicles; pod stipitate, moniliform . . . .
. . . . 774. **Sophora** L.
+ Petals white; flowers in racemes; pod compressed, linear
. . . . 777. **Maackia** Rupr. et Maxim.
78. Corolla consisting of standard alone (wings and keel wanting),
yellow; shrub . . . . ★ **Amorpha** L.
+ Corolla of 5 petals . . . . 79.
79. All stamens distinct . . . . 80.
+ Stamens monadelphous or diadelphous . . . . 81.
80. Shrub or undershrub with white petals . . . . . . 775. **Ammothamnus** Bge.
+ Herbaceous plants with yellow or whitish flowers. . . . . 774. **Sophora** L.
81. Stamens monadelphous . . . . 82.
+ Stamens diadelphous . . . . 83.
9 82. Filaments enlarged at summit; inflorescence capitate . . . .
. . . . 793. **Anthyllis** L.
+ Filaments subulate; inflorescence racemose . . . . 799. **Galega** L.
83. Shrubs or climbers . . . . 84.
+ Herbs or undershrubs . . . . 88.

84. Calyx broadly campanulate; pod strongly inflated, membranous; flowers yellow . . . . 803. **Colutea** L.
+ Calyx tubular, sometimes finally vesicular; pod not inflated; flowers blue, violet, or light purple . . . . 85.
85. Climber with pendulous racemes, in the USSR only in cultivation . . . . ★**Wistaria** Nutt.
+ Shrubs with erect inflorescence . . . . 86.
86. Connective of anthers with a tuft of hairs or a pointed appendage; indument consisting of bifurcate hairs . . . . ★**Indigofera** L.
+ Connective without hairs or appendage . . . . 87.
87. Pod jointed; branches spinescent . . . . 817. **Eversmannia** Bge.
+ Pod not jointed; branches unarmed . . . . 809. **Astragalus** L.
88. Pod indehiscent . . . . 89.
+ Pod dehiscing by 2 valves . . . . 96.
89. Pod excavated or deeply round-notched on the upper margin, breaking up into crescent-shaped or horseshoe-shaped segments . . . . 816. **Hippocrepis** L.
+ Upper margin of pod entire . . . . 90.
90. Pod membranous, inflated, many-seeded, with stipe to 10 mm long . . . . 801. **Sphaerophysa** DC.
+ Pod neither membranous nor inflated, sessile or short-stipitate . . . . 91.
91. Pod not separating into joints . . . . 92.
+ Pod jointed, often breaking up into joints . . . . 93.
92. Pod linear, terminating in a hooked beak . . . . 794. **Securigera** DC.
+ Pod nutlike, 1-seeded, prominently reticulate, with marginal crest beset with teeth and prickles . . . . 819. **Onobrychis** Gaertn.
93. Flowers in racemes . . . . 94.
+ Flowers in umbellate or capitate inflorescences . . . . 95.
94. Mature pod readily breaking up into joints . . . . . . 818. **Hedysarum** L.
+ Pod constricted between the seeds but not separating into joints . . . . 811. **Glycyrrhiza** L.
95. Keel obtuse; annuals . . . . 814. **Ornithopus** L.
+ Keel beaked; perennials . . . . 815. **Coronilla** L.
96. Keel beaked or point-tipped . . . . 810. **Oxytropis** DC.
+ Keel beakless, obtuse or acute . . . . 97.
97. Plants covered with viscous glands or glandular hairs . . . . 98.
+ Plants eglandular . . . . 99.
98. Leaflets toothed . . . . 824. **Cicer** L.
+ Leaflets entire . . . . 811. **Glycyrrhiza** L.
99. Keel half as long as wings; inflorescence umbelliform, 2- or 3-flowered . . . . 808. **Gueldenstaedtia** Fisch.
+ Keel equaling wings or nearly so; inflorescence commonly many-flowered, racemose or capitate . . . . 809. **Astragalus** L.

Subfamily 1. **MIMOSOIDEAE** Taub. in Engl. u. Prantl. Pflanzenfam. III, 3 (1891) 99.— Flowers actinomorphic; flowers inconspicuous; aestivation valvate. Trees or shrubs with bipinnate leaves (in USSR representatives) or with phyllodes.

Tribe 1. **INGEAE** Benth. in Benth. et Hook. f. Gen. 1 (1865) 464. — Stamens numerous, connate at base into a tube. Trees with bipinnate leaves.

Genus 770. **ALBIZZIA** * DURAZZ.**

Durazz. in Mag. toscan. III, 4 (1772) 11. — Serianthes Benth. ex Hook. in Lond. Journ. Bot. III (1844) 225, p.p.

Calyx campanulate or tubular, 4- or 5-toothed; corolla infundibular, regular, the 4 or 5 petals united to the middle; pod broadly linear, straight, slender, indehiscent or dehiscing by 2 valves, dry, without pulp, 1-celled. Tall trees or shrubs, with bipinnate leaves and numerous small leaflets.

Albizzioxylon hyrcanicum A. Nikitin in Tertiary upper Pliocene of E. Transc. (Karayazy).

1. **A. julibrissin** Durazz. l. c.; Medv., Der. i kust. Kavk. (1919) 94; Grossg., Fl. Kavk. II (1930) 247; Gonchar., Fl. Tadzhik. V (1937) 127. — Acacia julibrissin Willd. Enum pl. (1809) 1052; Ldb. Fl. Ross. I
11 (1842) 742; Ov. i Sit., Opyt russko-kavk. fl. (1858) 57; Vol'f and Palibin, Opred. (1904) 512. — Ic.: Rchb. Ic. Fl. Germ. 22 (1867 — 1886) tab. 7; Shirasawa, Ic., Ess. Forest. Jap. 1 (1900) tab. 31; Britton and Brown, Ill. Fl. N. States and Canada II (1913) 331; Vol'f and Palibin, l. c., 512, 513. — Exs.: T. Alexeenko Fl. cauc. exs. No. 6493.

A low tree with loosely spreading top; leaves bipinnate, with 8 — 12 pairs of pinnae, each with 15—20 pairs of leaflets, these oblong-semifalcate, acute, dark green above, light green beneath; petioles with a small flat gland at base; petals yellow; filaments long, pink, connate at base; style filiform, with small stigma; pod linear, flat, glabrous, membranous, many-seeded, often constricted between seeds, greenish when young, 10—20 cm long; seeds elongate-ovaloid, dull, 0.6 cm long. June—July. (Plate I, Figure 3).

Occurring in the lower forest belt, at altitudes between 100 and 150 m, in loose soils, singly or in groups. — Caucasus: Tal. **Gen. distr.**: Iran., Ind.-Him. Cultivated in tropical and subtropical countries as well as in S. Europe. Described from cultivated specimens.

Economic importance. Wood dense, hard, used for industrial purposes. A beautiful tree, long cultivated in the gardens of the Caucasus, the Crimea, and the southern part of Soviet Central Asia.

Tribe 2. **ACACIEAE** Benth. in Benth. et Hook. f. Gen. I (1865) 464. — Stamens numerous, distinct, rarely the innermost series connate into a very short ring. Trees or shrubs, with bipinnate leaves or phyllodes.

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* Named for F. Albizzi, who introduced this plant into Florence from Constantinople in 1749.

** Treatment by I.V. Palibin.

Genus ★ **ACACIA**[*] WILLD.[**]

Willd. Sp. pl. IV, 2 (1806) (1049.— Phyllodoce Link Handb. II (1831) 132, non Salisb.— Farnesia Gasp. Descr. nov. gen. (1838).

Flowers small, yellow or whitish yellow, bisexual or polygamous; inflorescences many-flowered, capitate or cylindric-racemose, erect or nodding; calyx campanulate, crenate, rarely fringed or wanting; petals free or united with stamens; stamens numerous, distinct or briefly connate at base; ovary sessile or short-stipitate, 2 — many-seeded; fruit ovoid, lanceolate or linear, straight (?), leathery or woody. Trees or shrubs; stem unarmed or rarely spiny; leaves bipinnate with numerous small leaflets or reduced to phyllodes, commonly glanduliferous.

1. Tree with bipinnate grayish-green leaves; flowers in loose nodding inflorescences . . . . .1. **A. dealbata** Link.
+ Trees or shrubs with phyllodes . . . . 2.
2. Phyllodes oblanceolate; leaflets none; flowers in loose axillary inflorescences . . . . 2. **A. retinodes** Schlecht.
+ Phyllodes elongate-oval, rarely lanceolate, often terminating in elongate bipinnate leaf-blades; flowers in the axils of phyllodes . . . . 3. **A. melanoxylon** R. Br.

1. **A. dealbata** Link Enum. hort. Berol. II (1821) 445. — A. irrorata Sieb. ex Spreng. Syst. III (1826) 141. — A. affinis Sweet Hort. Brit. ed. 1 (1827) 102. — Ic.: Lodd. Bot. Cab. XXI, tab. 1928 (1833); Garden 42 (1892).

A tall tree with dark brown bark; shoots, leaves and petioles grayish-pubescent; leaves bipinnate; leaflets 8 — 15 pairs, small, elongate, grayish green; Flowers yellowish gray, fragrant, in heads forming numerous loose racemes; pods oblong, elongate-lanceolate, obtuse, 6—8 cm long and 0.8—1 cm broad, violet-brown, the seed compartments indicated by bulges on the valves; seeds brown, elliptic, ca. 0. 5 cm long. January—March.

Species naturalized along the Black Sea coast, in Sochi, Sukhumi, and Batumi. **Gen. distr.**: E. Australia. Described from cultivated specimens. Type in Berlin.

Economic importance. A common ornamental tree in gardens of the Mediterranean region. The flowering twigs are marketed in northern countries. The bark contains 15—20% of tanning substances. The wood is useful for carpentry and for cellulose extraction.

2. **A. retinodes** Schlecht. in Linnaea XX (1847) 884; Bailey, Stand. Encycl. I (1939) 185. — Ic.: Rev. hort. (1896) 505.

A tall shrub or small tree; phyllodes oblanceolate, 5—12 cm long and 0.3—1 cm broad, mucronate from obtuse apex, the margins coriaceous; racemes terminal, short, branched, with short glabrous peduncles; flowers in globose heads; pods linear-lanceolate, to 8—10 cm long and 0.5 cm broad, brownish cinnamon to brown; seeds rounded to elongate, dark brown, with fleshy funiculus. January—March.

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[*] From the Greek name akaki, used by Theophrastus and Dioscorides in reference to a spinous tree from Egypt, probably Acacia tortilis.

[**] Treatment by I.V. Palibin.

Cultivated in subtropical parts of Europe and North America; common in gardens along the Black Sea coast of the Caucasus (Batumi, Sukhumi). Type in Berlin. Described from S. Australia.

13 **Economic importance.** Cultivated in gardens along the French and Italian Riviera for export of flowering twigs to countries of northern Europe where they are known under the trade name "mimosa."

3. **A. melanoxylon** R. Br. in Ait. Hort. Kew. ed. 2 (1813) 462; Bailey, Stand. Encycl. I (1939) 185. — Ic.: Bot. Mag. (1814) 1659; Hegi III. Fl. IV, 3, 1124, f. 1288 (1924).

A tall tree with a dense top and dark bark; phyllodes oblanceolate to elongate-oval, saber-shaped, prominently 3—6-nerved and reticulate-veined between, scarcely cuspidate, short-petioled, on some shoots passing into elongate-pinnate leaves with small elongate-linear leaflets; flowers yellowish, 1—5 in the axils of phyllodes, forming short racemes; pods reddish brown, often curved or twisted; seeds numerous, oval-oblong, dark brown.

Commonly occurring in gardens and parks of Sukhumi, Batumi, and other localities along the Black Sea coast.— **Gen. distr.:** Australia (New South Wales, Victoria), Tasmania. Type in London.

Economic importance. A handsome open-ground tree, cultivated in all subtropical countries. The dark sapwood is characteristic. The wood is outstandingly tough and resembles black walnut; used for furniture and miscellaneous articles.

Some fifty Australian species of this genus are grown in the humid subtropics of the USSR. Some of these may be indicated as of economic value, such as A. baileyana F. v. M. (New South Wales), A. cultiformis A. Gunn. (S. Australia, New South Wales, Queensland), A. decurrens W. (Victoria, New South Wales), A. longifolia (S. Australia), A. pravissima F. v. M. (E. and S. Australia), A. pycnantha Benth. (S. Australia, Victoria, New South Wales), A. saligna Wendl. (W. Australia).

Tribe 3. ADENANTHEREAE Benth. in Benth. et Hook. f. Gen. I (1865) 463, p. p. — Stamens 10, distinct. Shrubs or undershrubs with bipinnate leaves

Genus 771. **LAGONYCHIUM** * M. B.**

M. B. Fl. taur.-cauc. III (1819) 288.

14 Flowers numerous in cylindric racemes, small, actinomorphic, quinary, ebracteate; calyx short, subpatellate, with small teeth; stamens free, equal somewhat exceeding petals; ovary oblong; style columnar, with simple slightly curved stigma; pod indehiscent, plump, apparently inflated, thick-

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[*] Inspired by the local Azerbaijani name of this plant, meaning hare claw. The Turkmenian name for this shrublet is koshach'i kogti.

[**] Treatment by E.G.Bobrov.

walled; exocarp subcoriaceous; mesocarp spongy, becoming indurated; endocarp cartilaginous, forming cross-partitions between seeds. A spiny shrublet; leaves bipinnate. A monotypic genus; the only species widespread through desert areas in the E. part of the Mediterranean region, from Egypt in SW to Tadzhikistan in NE. Russian name: mimozka.

1. **L. farctum** (Banks et Sol.) Bobr. comb. n. — Mimosa farcta Banks et Sol. in Al. Russel Nat. Hist. Aleppo ed. 2, II (1794) 266. — M. stephaniana M. B. Tableau des prov. sit. sur la côte occid. mer Casp. (1798) 720; Beschr. Länd. Casp. (1800) 205. — Acacia stephaniana Willd. Sp. pl. IV (1805) 1088; M. B. Fl. taur.-cauc. II (1808) 449. — Lagonychium stephanianum M. B., l. c., III (1819) 288; Ldb. Fl. Ross. I, 723, — Prosopis stephaniana (Willd.) Kunth ex Spreng. Syst. II (1825) 326; Boiss. Fl. or. II, 633; Grossg., Fl. Kavk. II, 247; Sorn. rast. SSSR, III, 146; Fl. Tadzh. V, 128. — P. farcata (Banks et Sol.) Eig in Journ. of Botany LXXXV (1937) 189. — Ic.: Sorn. rast. SSSR III, Fig. 251; Fl. Tadzh. V, 129. — Exs.: HFR No. 511; Fl. cauc. exs. No. 344; Fl. Palaest. exs. No. 247. Russian names: mimozka vypolnennaya [filled], nabitaya [packed], kolbasoobraznaya [sausage-shaped].

A small shrub or undershrub, mostly not more than 0.5 m high, much branched and spiny; roots rather thick, reddish, penetrating deep into the soil; branches erect, not more than 5 mm thick, gray, with straight reddish spines, puberulent when young; stipules solitary, deciduous, herbaceous, entire, oblong, acuminate, not exceeding leaflets; leaves ovate in outline, to 5 cm long, bipinnate, the rachis terminating in an inconspicuous point; pinnae 5 — 7 pairs, subopposite, their rachises pointed; leaflets 10—15 pairs, oblong, acuminate, somewhat inequilateral, subsessile, 3—5 mm long and to 2 mm broad, with dense short pubescence that imparts a grayish appearance to the plant as a whole; petioles and primary petiolules persistent; inflorescences axillary, pedunculate, cylindric, many-flowered, to 5 cm long, not surpassing leaves; flowers short-pediceled, whitish yellow; calyx patellate, with 5 small teeth; corolla to 5 mm long, four to five times length of calyx; stamens slightly exceeding petals; style about equaling stamens; pods few, 1 or 2 per inflorescence, large, plump, reddish brown, turning dark brown, to 4—5 cm long and to 2.5 cm thick; seeds numerous, round, compressed, light brown. Fl. May—June; fr. August. (Plate I, Figure 1).

Submontane plains and foothills in the desert belt, not more than 1,000 m above sea level, river valleys and seashores, often in saline soils, and as a weed. — Caucasus: E. Transc., Tal.; Centr. Asia: Kara K. (southern river valleys), Mtn. Turkm. (Kopet Dagh, Badkhyz, Kugitang), Amu D., Pam.-Al. (SW). **Gen. distr.:** E. Med., Iran. Described from the vicinity of Aleppo. Type in London.

Economic importance. A noxious weed, readily spreading due to formation of root-suckers. Because of the spiny branches, it is little eaten by livestock and then only when young. The roots contain tannids and may be of interest as a tanning agent.

Note. This species should definitely be referred to the genus Lagonychium established by Bieberstein and undeservedly disregarded by later authorities. This genus, so far monotypic, is clearly distinct and is not to be combined with the genus Prosopis. The latter contains more than twenty arboraceous and frutescent species characterized by their flat pods and distributed through tropical and subtropical regions of both hemispheres.

Subfamily 2. **CAESALPINOIDEAE** Taub. in Engl. u. Prantl, Pflanzenfam. III, 3 (1891) 125.

Flowers zygomorphic; petals imbricated in the bud, the odd upper petal inside and enclosed by the wings, these in turn enveloped by the two lower petals that are not united into a keel. Trees and shrubs with pinnate or bipinnate leaves.

Podogonium knorrii Heer in Sarmatian formations of Armenia (Zanga River). – P. latifolium Heer in Sarmatian formations of Armenia (Zanga River and Arzni).

Tribe 1. **BAUHINIEAE** Benth. in Hook. Journ. of Bot. II (1840) 74. – Stamens 10, free. Trees or shrubs with simple leaves.

Bauhinia cretacea Newberry in Upper Cretaceous deposits of Sakhalin (Mgachi).

Genus 772. **CERCIS** * L.**

L. Sp. pl. (1753) 374.

Calyx broad, slightly oblique, thickened; corolla papilionaceous, with divergent petals; stamens 10, free; pod stipitate, dehiscent, 4–7-seeded, the upper suture margined; seeds rounded-elongate, flat. Low trees with entire leaves; flowers in axillary clusters.

16 1. Flowers rose; pods elongate-linear, flat, the upper suture narrow . . . . 1. **C. siliquastrum** L.

+ Flowers purple-violet; pods truncate at upper margin, the upper suture broad . . . . 2. **C. griffithii** Boiss.

Cercis palaeogaea Pax in Sarmatian formations of Bl. (Krynka). – C. siliquastrum L. fossilis, ibid. – C. komarovii Palib. in Sarmatian formations of Armenia (Leninakan). – S. turgaica Uznadze in Tertiary deposits of Ar.-Casp.

1. **C. siliquastrum** L. Sp. pl. (1753) 374; Ldb. Fl. Ross. I, 718; Ov. i Sit., Opyt russko-kavk. fl. I (1858) 269; Boiss. Fl. Or. II, 633. – Siliquastrum orbiculatum Moench, Meth. (1794) 54; Sibth. Fl. graeca IV (1823) tab. 367. – Ic.: Bot. Mag. (1808) 1138; Rchb. Ic. Fl. Germ. XXII tab. 2. Vernacular name: Iudino derevo [Judas tree].

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* From Greek kerkis – shuttle, a tree name mentioned by Theophrastus and Aristotle; possibly an allusion to pod shape (?)

** Treatment by I.V. Palibin.

A rather small tree or shrub; leaves orbicular, obtuse, deeply cordate at base, with fan-shaped venation; flowers in few-flowered clusters in the leaf axils; corolla bright rose; calyx rose; standard shorter than wings and keel; wings strongly attenuate toward base; style with capitate stigma; pod elongate-linear, very narrowly winged along upper suture, 4- or 5-seeded; seeds rounded-ovate, black. April—June. (Plate I, Figure 2).

Occurring in gardens of the Crimea, the Caucasus, and Central Asia, also naturalized. **Gen. distr.**: W. and E. Med., Bal.-As. Min. Described from Italy. Type in London.

2. **C. griffithii** Boiss. Fl. Or. II (1872) 633; Fl. Tadzhik. V, 132. — C. siliquastrum var. griffithii Bornm. in Beih. z. Bot. Centralb. XIX (1905) 251. — C. siliquastrum O. et B. Fedtsch. Consp. Fl. turkest. (1906) 265, non L. — Ic.: Fl. Tadzhik., l.c., 135. — Exs.: Herb. Fl. Turkest. ed. Hort. Bot. Petri Magni No. 73.

A much branched shrub or tree 1—4 (10) m high; branches forming a wide top; bark reddish brown at first, becoming dark brown; leaves rounded-reniform, broadly cordate at base, muticous, bright green above, bluish glaucous beneath; flowers in short clusters; pedicels 8 — 11 mm long; calyx inflated, with short teeth; pod elongate, truncate at upper margin, coriaceous, with numerous prominent transversal nerves, the upper suture broadly wing-margined, the wing up to 3—5 mm broad; seeds few, oval, ca. 5—6.5 mm long and ca. 4—4.5 mm broad, glabrous, dark brown. May (Plate I, Figure 2a).

Loess and stony slopes at altitudes of (200) 800—2,000 (2,200) m. — Centr. Asia: Pam.-Al. (SW), Mtn. Turkm. **Gen. distr.**: Iran. Described from Afghanistan. Type in Geneva.

Economic importance. A beautiful ornamental shrub, flowering in early spring, suitable for gardens of the South.

Tribe 2. CASSIEAE Benth. in Hook. Journ. of Bot. II (1840) 72. — Fertile stamens 5 or 7; calyx 5-toothed; corolla of 5 equal petals or wanting. Trees, shrubs or herbs with paripinnate leaves.

Genus **CERATONIA** * L. **

L. Gen. pl. ed. 5 (1754) 450.

Calyx with 5 short early deciduous segments; corolla absent; flowers of three types: 1) staminate, with 5 stamens and rudimentary style, 2) hermaphrodite with long stamens and fertile pollen and 3) hermaphrodite with short stamens and obsolescent anthers with sterile or fertile pollen; bracts small, scalelike, caducous; disk of staminate flowers cup-shaped; style short, with enlarged stigma; pod elongate, pulpy, indehiscent. Trees with paripinnate evergreen leaves.

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* From keratonia, old Greek name for this tree.

** Treatment by I. V. Palibin.

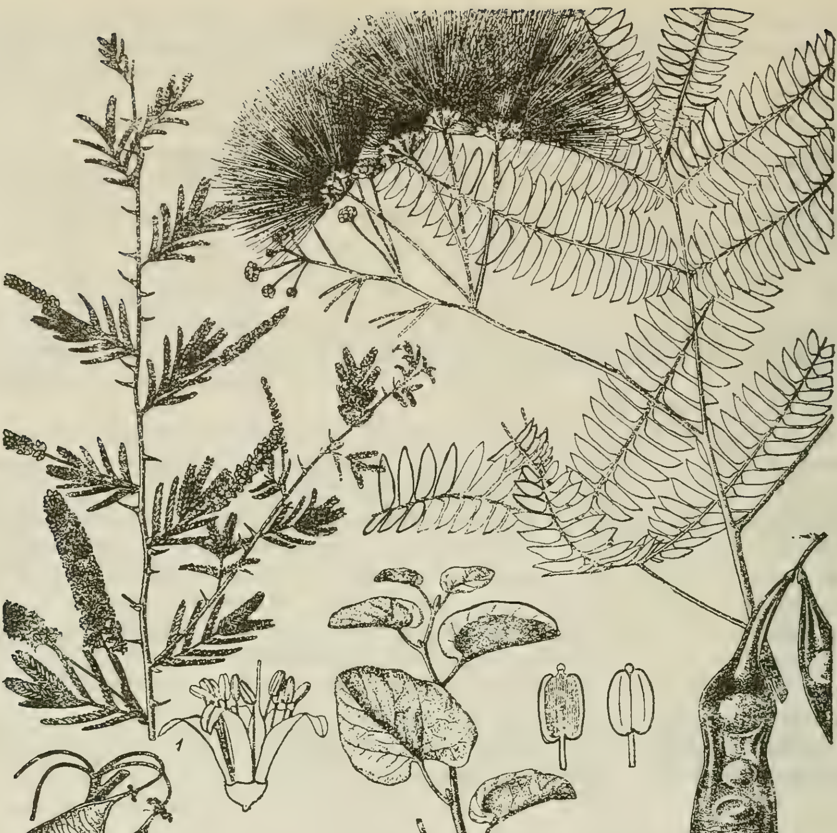

PLATE I. 1 – Lagonychium farctum (Banks et Sol.) Bobr., flowering branchlet, flower: 1a) pod in cross section; 2 – Cercis siliquastrum L., branchlet with flowers, stamens, 2a) pods. C.griffithii Boiss.; 3 – Albizzia julibrissin Durazz., branchlet with flowers, pod.

1. **C. siliqua** L. Sp. pl. (1753) 1026; Monyushko, Rozhkovoe derevo i vozmozhnost' ego kul'tury v SSSR [The Carob Tree and its Cultivation Prospects in the USSR] (1934). — Ic.: Rchb. Ic., Fl. Germ. 22 (1876), tab. 3; Hegi, Ill. Fl. IV, 3, 1132, f. 1295. Vernacular names: Tsaregdarskie rozhki, rozhkovoe derevo.

Tree, 6 to 12 m high, with a straight trunk and large top; leaves alternate, short-petioled, evergreen, paripinnate, with 3 or 4 pairs of leaflets; leaflets elliptic, lustrous above, dark green and somewhat pubescent beneath; pod flat, slightly curved, 5—20 cm long, with pulpy cross-partitions, edible; seeds obovate, compressed, shining. September—October.

Cultivated along the Black Sea coast of the Caucasus, especially in Abkhazia between Gagra and Sukhumi. **Gen. distr.**: E. Med. (Arabia and possibly Syria). Long in cultivation in the Mediterranean region. Described from a cultivated specimen from Italy.

Economic importance. The indehiscent pods with fleshy pulp have the following percent composition (according to Koenig): water 14.96, nitrogenous compounds 5.86, crude fat 1.28, nitrogenfree extract [?], sugar 68.98, fiber 6.93, ash 2.53. Relished by children in raw condition. In many Mediterranean countries the pods are fed to horses and cattle. Seeds were used in former days as weight units under the Arabic name "karat."

Genus* **CASSIA** * L.**

L. Sp. pl. (1753) 376.

Sepals 5, scarcely united at base; petals broad, clawed, unequal, notched at apex, spreading; stamens 10, unequal, 3 upper ones often without anthers, 2 lateral short and straight, 3 lower ones long and curved; anthers opening by apical chinks; ovary stipitate; style filiform, curved; pods with cross-partitions, coriaceous, often broad, flat or cylindric, of firm consistency. Shrubs, undershrubs or herbs, with paripinnate leaves.

Cassia ambigua Ung. in the Oligocene of V.-Don. (Zmiev, according to Koval'), in Sarmatian formations of Bl. and L. Don (Amvrosievka, Adagum), in the Pliocene of E. Transc. (Zanga). — C. atavia Velen. in Upper Cretaceous deposits of E. Transc. (Aush). — C. berenices Ung. in Sarmatian formations of E. Transc. (Khvteeba) and Bl. (Amvrosievka). — C. lignitum Ung. in the Poltava series of Upper Oligocene of V.-Don (Zmiev); in Sarmatian formations of E. Transc. (Khvteeba); in Tertiary deposits of Sakhalin (Mgachi). — C. cf. melanocarpa Velen. in Upper Cretaceous deposits of S. Transc. (Aush). — C. phaseolites Ung. in the Upper Oligocene of V.-Don (Zmiev, according to Koval'), in Sarmatian formations of L. Don (Adagum) and E. Transc. (Khvteeba), and in Tertiary deposits of W. Transc. (Goderzi).

1. **C. marylandica** L. Sp. pl. I (1753) 378; Ov. i Sit., Opyt russko-kavk. fl. I (1858) 568; Hegi Ill. Fl. IV, 3 (1927) 1130. — Ic.: Britt. and Brown Ill. Fl. N. Am. II (1913) 336, f. 2438; Hegi, l. c., f. 1294.

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* An ancient name for some aromatic plant, used by Dioscorides and other Greek writers.

** Treatment by I. V. Palibin.

Perennial, glabrous or slightly pubescent, ca. 1 m high; inflorescences dense, in the axils of stem leaves; leaves paripinnate; leaflets 12–20, oblong-oval or linear-oblong, obtuse, point-tipped, rounded at base; stipules small, subulate; calyx lobes ovate-oblong; stamens 10, of these 3 usually abortive; pod flattened, stipitate, linear, glabrous or slightly pubescent, curved; seeds rounded-oblong, dark, dull. July–August.

Cultivated in the gardens of Transcaucasia as an ornamental and medicinal plant; commonly known as Maryland Senna and used as a substitute for Alexandrian Senna or Alexandrian Leaf obtained from C. acutifolia Del. and renowned for its purgative action. Described from the eastern part of North America (Maryland, Virginia). Type in London.

21 Tribe 3. **EUCAESALPINIEAE** Benth. in Hook. Journ. of Bot. I (1840) 72. — Flowers polygamous; calyx teeth 3–5; petals 3–5, subequal; stamens 6–10, free. Trees with bipinnate leaves or some simply pinnate.

Genus 773. **GLEDITSCHIA** * L.**

L. Sp. pl. ed. 5 (1754) 476.

Calyx with broadly turbinate tube and 3–5 narrow subequal lobes; petals 3–5, unequal, free; stamens 6–10, free; ovary sessile, with a short style and 2–many ovules; pod coriaceous, laterally compressed, almost indehiscent, pulpy, 1-many-seeded; seeds elongate-ovate. Trees with pinnate or bipinnate leaves, simple or branched spines on stems and branches, and unisexual flowers in short racemes.

Gleditschia duiensis Heer in Tertiary deposits of Sakhalin (Due). — G. celtica Ung. in Sarmatian formations of Bl. (Amvrosievka).

1. Spines simple, rarely branched; pods broad, straight . . . . **G. caspia Desf.**
+ Spines commonly branched, pods elongate-lanceolate, often undulate . . . . 2. **G. triacanthos** L.

1. **G. caspia** Desf. Hist. d'arbr. II (1809) 247; Ldb. Fl. Ross. I, 718; Ov. i Sit., Opyt russko-kavk. fl. I (1858) 570; Vol'f and Palibin, Opred. derev. i kust. (1904) 513; Medv., Der. i kust. (1919) 92; Grossg., Fl. Kavk. II, 248. — Ic.: Vol'f and Palibin, l.c.; Silva Tarouga Freil. Laubg. (1913) 226.

A low tree with a dense spherical top; branches with yellowish-green bark; spines long, straight, stiff, laterally compressed, often branched, black; leaves clustered, imparipinnate, sometimes bipinnate; leaflets elongate-elliptic, entire or slightly crenate, to 5 cm long; racemes axillary, 10–12 cm long, shorter than leaves; calyx and corolla appressed-pubescent; pod long-stipitate, pendulous, straight or curved, broad, subcoriaceous, to 20–25 cm long, blackish brown; seeds cinnamon, oval, dull, 8–10 mm long.

Solitary or in groups in lowland woods, on dry soil. — Caucasus: E. Transc., Tal. Endemic? Described from the Black Sea coast. Type in Paris.

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* Named for J.G. Gleditsch (1714–1786), professor of botany in Berlin.

** Treatment by I.V. Palibin.

Economic importance. Wood hard, very compact, used for miscellaneous purposes.

2. **G. triacanthos** L. Sp. pl. (1753) 1056; Ov. i Sit., Opyt russko-kavk. fl. (1858) 570; Shmal'g., Fl. Yugo-zap. Ross. (1886) 170. — Ic.: Sargent, Silva N. America, III (1892) 125, 126; Hegi, Ill. Fl. IV, 3, 1128, f. 1293 (1924), Baenitz. Pl. europ. No. 2009.

A robust tree, with wide-spreading top and dark brown bark; spines long, simple or branched; leaves paripinnate, long-petioled; leaflets 8—13 pairs, subsessile, ovate-lanceolate, entire or crenulate, toward apex, slightly pubescent beneath; inflorescences short, racemose, glabrous; calyx and corolla pubescent; ovary villous, with broad fungiform stigma; filaments hairy, with green anthers; pod elongate-lanceolate, coriaceous, marginate, to 20—30 cm long, often undulate-twisted, tapering toward tip, dark cinnamon, filled with pulp; seeds in separate compartments, elongate-elliptic, dull cinnamon, to 1.5 cm long.

Occurring in southern regions of the European part, in the Crimea, the Caucasus, and Central Asia, in gardens and parks. Cultivated in temperate areas throughout the world. Described from Virginia. Type in London.

Economic importance. A tree with compact wood; a good honey plant. The pods are used in America for the production of an intoxicating beerlike liquor. The seeds are edible and are employed as a substitute for coffee.

Genus ★**CAESALPINIA** * L.**

L. Gen. pl. ed. 5 (1754) 178.

Calyx lobes 5, large, united at base, imbricate, the lower larger; petals 5, large, orbicular or oblong, the upper slightly smaller; stamens 10, free, the long filaments hairy below; ovary sessile, few-ovuled, the style about equaling stamens; pod lanceolate, compressed, leathery; seeds obovate, flattened. Large shrubs with bipinnate leaves and loose racemose inflorescences. More than thirty species are distributed through tropical and subtropical regions.

1. **C. gilliesii**† Wall. in Hook. Bot. Misc. I (1830) 129; Bailey, Stand. Cycl. hort. J (1939) 612. — Poinciana gilliesii Hook., l. c. — Ic.: Hook., l. c., tab. XXXIV; Bot. Mag. No. 4006.

A much branched shrub, 1—2 m high, less frequently a small tree, with light brown bark and scabrous young branches; stipules ovate-triangular, shorter than leaflets, ciliate-dentate; leaves bipinnate, with 8—10 subopposite pinnae; ultimate leaflets 6—9 opposite, 6—9 pairs, oblong, 0.5—1 cm long, obtusish, glabrous, on short petiolules; inflorescence a loose umbelliform raceme, densely glandular-pubescent; pedicels longer than flowers, also glandular-pubescent; calyx lobes dark yellow, pubescent, lanceolate, obtusish, 1.5—2.5 cm long, ciliate-dentate, more so toward tips; petals 2—4 cm long, bright yellow, obovate, distinctly clawed, entire, the upper ones somewhat broader; filaments to 10–12 cm long, bright red, ciliate-hairy and somewhat dilated below; anthers bilocular, pale red; ovary oblong, compressed, glandular and short-hairy; style very long; pod flat, ca. 10 cm long and ca. 2 cm broad, short-hairy and glandular, containing 6–10 grayish-brown seeds. Fl. June-August; fr. July-September.

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* After Andreas Caesalpini, professor of botany at Pisa (1519—1603).

** Treatment by E.G. Bobrov.

† Named for Dr. Gillies who discovered this plant and brought it to the notice of European botanists.

Cultivated for ornament. – European part: Crim. (S. coast); Caucasus: W. and especially S. and E. Transc., Tal.; Centr. Asia: Kara K. (Krasnovodsk and neighboring railroad settlements), Pam.-Al. (SW). Cultivated throughout S. Europe. Described from Argentina. Type in London.

Economic importance. A very effective ornamental shrub, standing up to desert conditions, but somewhat susceptible to frost damage. In the Vakhsh River valley, where damage by frost rarely occurs, the plant attains the the stature of a small tree. There are some indications concerning toxicity of the seeds.

Subfamily 3. **PAPILIONATAE** Taub. in Engl. u. Prantl, Pflanzenfam. III, 3 (1891) 184.

Flowers zygomorphic; petals imbricated in the bud; uppermost petal (standard) exterior, enclosing the wings, these in turn enveloping the two lowermost that are coherent in upper part and form the keel. Herbaceous plants, shrubs or (rarely) climbers, very rarely trees.

Tribe 1. **SOPHOREAE** Spreng. Anleit. ed. 2, II (1818) 741, p.p. – Stamens free; leaves pinnate. Trees, shrubs, rarely herbs.

Genus 774. **SOPHORA** * L.**

L. Gen. pl. (1754) 175.

Flowers yellow, in racemes, these sometimes forming a panicle; calyx with short triangular teeth; standard oval; keel-petals overlapping on the back or united; pod moniliform, cylindric or somewhat 4-angled,
24 indehiscent or tardily dehiscent. Perennial herbs, shrubs or trees, with imparipinnate leaves and thickish creamy or bluish-violet flowers. Sophora species contain alkaloids.

Sophora edelsteinii Palib. in Tertiary deposits of USSR. (Botchi). – S. europaea Ung. in the Poltava series of Upper Oligocene of V.-Don (Zmiev, according to Koval'). – S. schmidtiana Heer in Tertiary deposits of Sakhalin (Mgachi, Due), Upper Cretaceous layers of Sakhalin (Zhonk'er), and Ang.-Say. (Ushakovka River and Malinovka in southern Baikal area). – Sophora sp. in Tertiary deposits of Balkh. (Ashutas). – S. novalis Pim. in Sarmatian formations of Bl. (Amvrosievka). – Phyllites sp. (? Sophora) in Tertiary deposits of Sakhalin (Kozulinkina Ravine).

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* Name derived from Arabic asfar – yellow.

** Treatment by I.T. Vasil'chenko.

1. Trees . . . . ★1. **S. japonica** L.
+ Shrubs or perennial herbs . . . . 2.
2. Shrubs . . . . 2. **S. griffithii** Stocks.
+ Herbs, the stems sometimes woody at base . . . . 3.
3. Pods somewhat 4-angled; keel rounded-obtuse at tip . . . . 6. **S. flavescens** Ait.
+ Pods terete; keel point-tipped . . . . 4.
4. Pods thickened, often clavate, sometimes slightly constricted between the seeds . . . . 5. **S. pachycarpa** C. A. M.
+ Pods moniliform, strongly constricted between the seeds . . . . 5.
5. Leaflets white-hairy above . . . . 3. **S. alopecuroides** L.
+ Leaflets green, glabrate above . . . . 4. **S. prodanii** Anders.

Section 1. **EUSOPHORA** DC. Prodr. 2 (1825) 95. — Pods wingless; keel not pointed at tip.

★1. **S. japonica** L. Mant. I (1767) 68; DC. Prodr. II (1825) 95; Benth. Fl. Hongk. (1861) 95; Forbes et Hemsl. in Journ. Linn. Soc. XXIII, 202; Lecompte, Fl. génér. de l'Indo-Chine (1908—1923) X, 504; Gagnepain in Not. Syst. Herb. Mus. de Paris III (1914—1918) 15. Vernacular name: tukhmyak[*] (Uzbek?).

Tree to 10 m; leaves imparipinnate; stipules soon deciduous; leaflets 9—13 (15), pubescent, 20—50 mm long, 8—25 mm broad, borne on short spreading petiolules, acute, green above, glaucescent beneath; flowers in racemes forming large terminal panicles; calyx with scattered short hairs, the very short broadly triangular teeth densely beset on the margin with short white hairs; corolla yellowish white, ca. 10 mm long; standard oval, slightly notched at apex; wings oval-subovate, with basal teeth; keel-petals oval, slightly falcate; pods cylindric, moniliform, with mostly 1—5 developed seeds, slender in parts with abortive seeds, somewhat pulpy, dark reddish. Fl. July; fr. from September.

Cultivated in gardens in southern regions of the USSR (Central Asia, Caucasus, S. regions of the European part). The exact distribution at present is unknown because of lack of sufficient material. — **Gen. distr.**: Japan and China; cultivated in countries of W. Europe. Described from Japan. Type in London.

Economic importance. A toxic plant. A yellow dye is prepared from the pods to color silky fabrics (Korshinskii's report for Namangan).

Section 2. **EDWARDSIA** (Salisb.) Taub. in Engl. u. Prantl, Pflanzenfam. III, 3, 195. — Edwardsia Salisb. in Trans. Linn. Soc. IX (1808) 248. — Pod 4-winged.

2. S. **griffithii** Stocks in Hock. Journ. IV (1852) 147; Gagnepain in Not. Syst. Herb. d. Mus. d. Paris III (1914—1918) 17. — S. korolkovi Koehne, Deutsch. Dendrolog. (1893) 323. — Keyserlingia griffithii Boiss. Fl. Or. II (1872) 630.

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[*] It is possible that the name "tukhmyak" is an Uzbekized version of Tadzhik "tukhmok" or "tukhmak," literally testicle, possibly alluding to the individual segments of the pod as resembling tiny testicles.

A shrub with imparipinnate leaves; leaflets 17–31, oval, short-petioluled, green and glabrate or more or less hairy above, white-tomentose beneath; flowers yellow, in racemes; calyx broadly campanulate, densely hairy, with very short broadly triangular teeth; standard oval, slightly notched at apex, somewhat exceeding wings and keel, gradually attenuate toward base; pods 4-angled, more or less curved, winged, constricted between seeds. April.

May be grown for ornament. Reported for Syr D. (foothills in the Fergana area—near Andizhan and Namangan). **Gen. distr.**: Iran, Afghanistan. Described from Baluchistan.

Section 3. **GOEBELIA** (Bge.) Taub., l. c., — Goebelia Bge. ex Boiss. Fl. Or. II (1872) 628. — Perennial herbs; pods cylindric, bulging about the seeds; racemes spiciform.

3. **S. alopecuroides** L. Sp. pl. (1753) 373; Fedch., Rast. Turk. (1915) 505. — Goebelia alopecuroides Bge. ex Boiss. Fl. Or. II (1872) 628; Grossg., Fl. Kavk. II (1930) 248; Kryl., Fl. Zap. Sib. VII (1933) 1580. — Gagnepain in Not. Syst. Herb. d. Mus. d. Paris III (1914–1918) 16. — Ic.: Pall. Sp. Astrag. (1800) tab. 87; Ldb. Ic. pl. Fl. Ross. IV (1833) tab. 365; Sorn. rast. SSSR III (1934) 149.

Perennial; stem 50–80 (100) cm long, branched, usually densely leafy in upper part, puberulent; leaves imparipinnate; leaflets 5–12 pairs, oval or oblong, 15–40 mm long and 5–15 mm broad, covered on both sides with 26 short white silky hairs; flowers white or creamy, in dense many-flowered elongated terminal inflorescences; calyx broadly campanulate, densely puberulent, the broadly triangular teeth one-fifth to one-quarter length of tube; standard obovate, attenuate toward base, equaling or exceeding wings and keel; wings wrinkled and transversely plicate along one margin; keel acute; pods numerous at ends of stems, 5–12 mm long, moniliform, more or less curved, indehiscent, appressed-pubescent, with long slender sterile intervals between the distant seeds, sometimes with all seeds abortive; seeds globose-ovoid, yellowish to light brown, sometimes darker, smooth, somewhat shining, with a round hilum, 4–5 mm long and 3–4 mm broad. May–June.

Riverline and lacustrine meadows, tugaic soils,* less frequently in steppes and deserts with a high water table; as a weed among crops and in rubbish-strewn places. It usually occurs in dense but not extensive thickets, often together with other plants, especially in depressions and in river valleys, on more or less saline soils with a good supply of water at least periodically. — European part: L. V., Crim.; Caucasus: Cisc. (part adjacent to the Caspian), E. and S. Transc.; W. Siberia: Alt. (S.), Irt., (S., Semipalatinsk); Centr. Asia: throughout except mountains. **Gen. distr.**: Bal.-As. Min., Iran., Dzu.-Kash. Described from "the Orient." Type in London.

Economic importance. A weed difficult to eradicate because of the strong root system. Poisonous. Presence of seeds as impurity in cereal grain may be toxic. Not eaten by cattle. The plant contains alkaloids related to those of S.pachycarpa but in smaller amount and with somewhat milder action.

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* [Tugai = bottomland complex with woods, bushes, and meadows in river floodplains (Soviet Central Asia).]

4. **S.prodanii** Anders. in Journ. Arn. Arboretum XVI (1935) 76 cum ic. — S.alopecuroides var.glabrescens Transch. in herb.

Perennial; stems coarse, woody at base, 50—75 cm long; leaves imparipinnate; leaflets 9—12 pairs, oblong-elliptic, 12—20 mm long and 7—10 mm broad, glabrous or nearly so above, sparsely hairy beneath, green on both sides, usually revolute at margin; racemes terminal, densely many-flowered; calyx slightly hairy, with short triangular teeth; corolla creamy, 15—18 mm long; standard strongly divergent, obovate; wings 2.5—3 mm broad, somewhat narrower than those of S.alopecuroides, transversely wrinkled in lower part; pods 50—70 mm long, slightly appressed-hairy to subglabrous, moniliform, cylindric, upright, seeds 3—7, buff, 5 mm long. May—June.

Wood margins and scrub; sometimes a weed in fields. — European part: Crim. (S. coast); Caucasus: W. Transc. (Tuapse — Sochi). Possibly occurring in Bessarabia. **Gen. distr.:** Bal.-As. Min. (Balkan Peninsula). Described from Mt. Babatag in Dobruja. Type in London and at Harvard.

Economic importance. The seeds of this plant are believed by the local population to be poisonous.

5. **S.pachycarpa** C. A. M. Ind. sem. Horti Petrop. IX (1843) 89; B. A. Fedch., Rast. Turk. (1915), 505; Gagnepain in Not. Syst. Herb. d. Mus. d. Paris III (1914—1918) 17. — Goebelia pachycarpa Bge. ex Boiss. Fl. Or. II (1872) 629. — Ammothamnus (Sophora) intermedia O. Ktze. in A. H. P. X (1887) 181.

Perennial; stems 30—60 cm long, usually branched almost from base, profusely leafy, the long erect branches covered with short appressed white hairs; leaves imparipinnate; leaflets 6—12 pairs, oval or oblong, 15—20 mm long and 3—7 mm broad, covered on both sides with short appressed white hairs; flowers white to creamy-yellow, in narrow cylindric terminal racemes; calyx broadly campanulate, densely puberulent, the tube several times the length of the broadly triangular teeth; standard obovate, about equaling wings and keel; wings transversely rugulose along one margin; pods few, indehiscent, sparingly short-hairy, more or less club-shaped, with rather inconspicuous seed compartments, dark brown or blackish; seeds cinnamon or sometimes darker, with a round somewhat eccentric hilum, somewhat shining, to 5—6 mm long and 4—5 mm broad. May—June. (Plate 2, Figure 3).

Loess and sandy soils in desert foothills. The plant is dependent on a raised ground water table and thus occurs mostly in loose groups near washout holes and depressions where it encroaches upon various desert plant associations. Occasionally it forms relatively dense thickets over considerable areas as a component of wormwood and ephemeral desert communities. Of wide occurrence as weed in dry and irrigated fields and in rubbish-strewn places; spreading under conditions of overgrazing. — Centr. Asia: Dzu.-Tarb. (valley train of the Dzungarian Ala-Tau), Balkh. (S. — along the Ili and Chu rivers, Muyun-Kumy), Ar.-Casp. (Sary-Su lowlands), T. Sh. (train), Syr D., Kyz. K. (SE border), Pam.-Al. (train), Amu D., Kara K. (S. — vicinity of Krasnovodsk), Mtn. Turkm. (train). **Gen. distr.:** Iran, Afghanistan. Described from the Chu River. Type in Leningrad.

Economic importance. Poisonous, containing the alkaloids sparteine, sophocarpine, and matrine. A very troublesome weed, spreading rapidly in plowfields and difficult to eradicate because of the strong root system. 28 The seeds are not easily distinguishable from mature cereal seeds; their occurrence as impurity in cereals may result in dizziness, vomiting, and other poisoning symptoms; the plant is in fact shunned by livestock. On account of these properties, S. pachycarpa has been classified as a quarantine plant. Some attention has recently been paid to S. pachycarpa as possible raw material for insecticide production. Preliminary experiments have indicated sufficient toxicity of the preparations obtained, their action resembling that of nicotine and anabasine in their toxic effect on sucking pests of crop plants. Technological processes are now being worked out for manufacture of insecticides.

6. **S. flavescens** Ait. Hort. Kew. ed. I, II (1769) 43; DC. Prodr. II (1825) 96; Ldb. Fl. Ross. I (1842) 716; Turcz. Fl. Baic.-dah. I (1842—1845) 272; Maxim. Prim. Fl. Amur. (1859) 87; Korsh. in A. H. P. XII (1892) 327; Forbs. et Hemsl. in Journ. Linn. Soc. XXIII (1886—1888) 202; Kom. Fl. Manchzh. II (1904) 567; Gagnepain in Not. Syst. Herb. d. Mus. d. Paris III (1914—1918) 17.

Perennial, to 0.5—0.7 m high, with branched stems; leaves imparipinnate; leaflets mostly 15—21, oblong-ovate or oval, to 30—50 mm long, 10—20 mm broad, those of upper leaves smaller, glaucescent and hairy beneath, green above, the petiolules short; flowers pale yellow, in a dense terminal raceme; calyx broadly campanulate, short-hairy, the very short inconspicuous teeth broadly triangular; corolla to 15 mm long; standard obovate, reflexed; wings strongly cross-wrinkled; keel-petals slightly curved; pods darkish cinnamon, pubescent, somewhat 4-angled, constricted between the elongated articles, 50—70 mm long, terminating in a beak 7—15 mm long, the stipe 7—10 mm long; seeds broadly short-oval, 4 mm long and 3 mm broad. Fl. July; fr. from end of August.

Scrub on mountain slopes, valleys of rivers and lakes especially on sandy soils; sometimes a weed of cultivated fields. — Far East: Ze.-Bu., Uda, Uss. **Gen. distr.:** Jap.-Ch. (Japan, Manchuria, China). Described from Siberia.

Economic importance. The plant contains toxic substances. May be useful for insecticide production. Medicinal.

Genus 775. **AMMOTHAMNUS** * BGE.**

Bge. in Arb. d. nat. Ver. zu Riga I (1848) 213.

Flowers whitish, in racemes; petals hairy on the outside; standard 29 curved, with basal teeth; keel-petals distinct; pod flexuous, few-seeded. Densely puberulent shrubs with imparipinnate leaves.

1. Leaflets obovate, often emarginate . . . . 1. **A. lehmanni** Bge.
+ Leaflets oblong to linear . . . . 2. **A. songoricus** (Schrenk) Lipsky.

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* From Greek thamnon — shrub, and ammos — sand.

** Treatment by I.T. Vasil'chenko.

1. **A. lehmanni** Bge. Al. Lehm. rel. bot. in Arb. nat. Ver. zu Riga I (1848) 214; Boiss. Fl. Or. II (1872) 628. — Exs.: HFR No. 410.

A small shrub, 50—80 cm high; stem profusely branched; annotinous branches rather slender, upright, densely covered with short appressed whitish hairs; leaves pinnate, very long; stipules narrowly linear, somewhat adnate to petiole; leaflets 15—27, cuneate at base, erect, obovate, cuspidate from slightly emarginate apex, covered with short appressed hairs, the short petiolules light-colored; flowers whitish, racemed; calyx ca. 6—7 mm long, broadly campanulate, densely pubescent, one of the broadly triangular teeth somewhat longer and narrower than the others and slightly constricted; corolla 12—15 (17) mm long; standard oblong, slightly notched at apex, only at the curvature slightly hairy; wings oval, toothed at base, obtuse, pubescent; keel shorter than wings, hairy; pods moniliform, falcate, coiled, or spiraled, bulging about the 1—3 developed seeds, slender and flattened elsewhere, densely appressed-tomentose, 50—70 mm long and 2—3 mm broad; seeds ovaloid-subglobose, yellowish, ca. 3—4 mm long, with a round hilum. April—May.

Sands. — Centr. Asia: Kara K., Ar.-Casp. (SW part), Kyz. K. Endemic. Described from the Kyzyl-Kum Desert. Type in Leningrad.

2. **A. songoricus** (Schrenk) Lipsky in herb. (?) — Sophora songorica Schrenk (Pseudo-sophora) in Fisch. et Mey. Diagn. pl. nov. in Bull. Phys.-Math. Ac. Sc. No. 68 (1845) 307.

Shrub; branches numerous, upright, densely covered with short appressed whitish hairs, the young branches with whitish bark; leaves imparipinnate, reaching the middle of inflorescence, imparipinnate; leaflets 15—39, oblong to linear, decreasing in size up the rachis, the lowermost 10—20 mm long and 2.5—3.5 mm broad; leaflets of upper leaves small, linear; racemes dense, many-flowered, overtopping leaves; calyx campanulate, 7—9 mm long, densely pubescent, the lance-subulate teeth shorter than the tube; corolla whitish, 15—18 mm long, all petals with scattered hairs on the outside; standard oblong, strongly reflexed; wings oblong, somewhat exceeding the slightly curved keel; pods linear, serpentine, spiral or helicoid, densely tomentose, with 1—3 developed seeds, usually with withered remnants of the flower at base. May—June.

Sands and sandstone. — Centr. Asia: Balkh., Ar.-Casp. Endemic. Described from specimens collected by Schrenk in Balkh. on 8 June, 1943. Type in Leningrad.

Genus 776. **AMMODENDRON*** FISCH.**

Fisch. in DC. Prodr. II (1825) 523.

Calyx short-campanulate, 5-lobed; standard orbicular; petals of the keel slightly united; pod linear or oblong, compressed, indehiscent, winged, 1 (2)-seeded. Shrubs or small trees, with dense silvery silky pubescence, spinescent petioles, pinnate leaves, and violet racemed flowers. Suitable for sand fixing and ornament. Vernacular name: peschanaya akatsiya [sand acacia].

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* From Greek ammos — sand, and dendron — tree.

** Treatment by I.T. Vasil'chenko.

1. Racemes to 5–10 cm long, loose, with distant flowers . . . . **4. A. longiracemosum** H. Ra.
+ Racemes short, dense, with crowded flowers . . . . 2.
2. Leaflets oblong-obovate or broadly oblong or oval, 4–8 mm broad . . . . 3.
+ Leaflets linear, 1.5–3 (4) mm broad . . . . 4.
3. Pod glabrous . . . . **5. A. argenteum** (Pall.) O. Kntze.
+ Pod pubescent . . . . **6. A. lehmanni** Bge.
4. Leaflets 2 pairs . . . . **1. A. eichwaldi** Ldb.
+ Leaflets 1 pair . . . . 5.
5. Pod glabrous . . . . **2. A. conollyi** Bge.
+ Pod pubescent . . . . **3. A. karelini** Fisch. et Mey.

1. **A. eichwaldi** Ldb. in Eichw. Reise Casp.-Cauc. (1834) 37; Ldb. Fl. Ross. I (1842) 717; Boiss. Fl. Or. II (1872) 627. – A. sieversii Fisch. var. sablozkii Trautv. in Acta Hort. Petrop. V (1877) 428. – Exs.: HFR No. 813.

Shrub; leaflets 2 (rarely 3 or 4) pairs, linear, spinous-tipped, 15–30 mm long, 1.5–3 mm broad; petiole longer than leaflets, spinescent; stipules subulate (3) 5–7 mm long, usually coarse and lignified; flowers in short dense racemes; calyx 2.5–3 mm long, densely appressed-hairy, the triangular 31 teeth half as long as the tube; corolla 6–7 mm long; standard orbicular, shorter than keel and wings; wings oval-oblong, with a short broad tooth at base; keel somewhat shorter than wings, obtuse; pod 15–20 (25) mm long and 5–6 mm broad, appressed-puberulent, the rounded top surmounted by a short prickle, the curved stipe 5–7 mm long. Fl. May; fr. from June.

Clayey and stony, rarely sandy slopes and plains near the E. shore of the Caspian Sea. – Centr. Asia: Mtn. Turkm. (near Krasnovodsk), Ar.-Casp. (Ust-Urt). Endemic. Described from the vicinity of Krasnovodsk. Type in Leningrad.

2. **A. conollyi** Bge. ex Boiss. Fl. Or. II (1872) 627. – A. karelini Bge. pl. Lehm. p. 245, non Fisch. et Mey. – Exs.: HFR No. 703. Vernacular name: sezek.

Small tree or shrub; leaflets 1 pair, linear, 30–50 mm long and 2–3 (4) mm broad, terminating in a short pale point; petiole much shorter than leaflets, spinous-tipped; stipules small, deciduous; corolla blackish-violet, 5–7 mm long; calyx white-tomentose, the triangular teeth half as long as the tube; standard rounded-oval; wings oblong, with a small tooth at base; keel obtuse; pods glabrous, 20–30 mm long (in var. longisiliquum Litw. 20–50 mm), ca. 5 mm broad, spirally twisted, light-colored, the stipe 10–12 mm long. Fl. from April; fr. from June. (Plate II, Figure 1).

Quicksands. – Centr. Asia: Kyz. K., Kara K. Endemic. Described from the Kyzyl-Kum Desert. Type in Leningrad.

3. **A. karelini** Fisch. et Mey. in Ldb. Fl. Ross. I (1842) 717; B. A. Fedch., Rast. Turk. (1915) 506.

Shrub; leaflets 1 pair, 25–50 mm long, 2–4 mm broad, short-aristate; petiole thickened, much shorter than leaflets, spinous-tipped, 7–12 mm long; stipules 3–5 mm long, subulate, mostly thin, deciduous; racemes short, dense; corolla ca. 5–7 mm long; standard suborbicular, in expanded flowers somewhat shorter than keel and wings; pod appressed-puberulent, oblong, (15)20–25 long and (5)6–7 mm broad, straight or slightly twisted; stipe slender, puberulent, 8–10 mm long, densely white-bearded at summit with long hairs. Fl. April; fr. from May.

Sands.—Centr. Asia: Kara K., Kyz. K. Endemic. Described from the E. shore of the Caspian (Dardzha Peninsula). Type in Leningrad.

4. **A. longiracemosum** H. Ra. in Not. Sust. ex Herb. H. B. P. III (1922) 40.

Shrub; leaflets 1 pair, (25 30–60 mm long and 1.5–2 (3) mm broad; petiole 3–5 mm long, slender, terminating in a slender point-tipped spine; stipules small, lance-subulate, thin, deciduous; racemes very loose, to 5–10 cm long, the flowers distant; calyx 3–4 mm long, the teeth two-thirds as long as to equaling the tube; corolla ca. 7 mm long; standard orbicular, in expanded flowers slightly reflexed and shorter than wings and keel; wings oblong, obtuse, 7 mm long; keel obtuse; pedicels slender, in lower part of raceme to 10–15 mm long, in upper part shorter; pods glabrous, linear (there were no mature pods on plants collected and described by I. Raikova). Fl. May–June. (Plate II, Figure 2).

Central Asia: Ar.-Casp., Kyz. K. (Khorezm). Endemic. Described from the Tokmat-ata Peninsula in the Aral Sea. Type in Leningrad.

5. **A. argenteum** (Pall) O. Ktze. in A. H. P. X (1887) 180; Krylov, Fl. Zap. Sib. VII (1933) 1581.— A. sieversii Fisch. in DC. Prodr. II (1825) 523.— Sophora argentea Pall. in Nov. Act. Petrop. X (1797) 373.— Podalyria argentea Willd. Sp. pl. II (1799) 502.— Ic.: Ldb. Ic., pl. Fl. Ross. II, tab. 107.

Shrub, 30–50 cm high; leaflets 1 pair, shortly spinous-awned; petioles spinescent; stipules subulate, 1.5–2.5 mm long, often soon deciduous; leaflets oblong-obovate, 10–25 (30) mm long and 4–8 mm broad, silvery-silky on both sides with dense appressed hairs; racemes dense, ovaloid; pedicels 4–8 (10) mm long; calyx white-hairy, 3 mm long; corolla dark violet, dingy yellowish at base; standard 4.5–5.5 mm long; wings oblong-obovate, 6.5–7 mm long, scarcely exceeding the obtuse keel; pod 18–20 mm long and 5–6 mm broad, glabrous, hairy only at base. Fl. May; fr. from June.

Solonetz plains and slopes.— W. Siberia: Irt.; Centr. Asia: Ar.-Casp. (E. part), Balkh., T. Sh., Syr D.; **Gen. distr.**: Dzu.-Kash. Described from the upper reaches of the Irtysh River (Semipalatinsk Region). Type in Leningrad.

6. **A. lehmanni** Bge. in Boiss. Fl. Or. II (1872) 626.— A. argenteum var. lehmannianum (Bge.) Lipsky in herb.

Shrub; leaflets 1 pair, oblong-obovate, spinous-awned, 30–40 mm long and 5–8 mm broad; petiole about as long as leaflets, spinous-tipped; stipules subulate, spinescent, becoming woody and persistent or deciduous; racemes short, dense, resembling those of A. argenteum (Pall.) O. Ktze., as do the flowers; pods ovaloid, densely appressed-puberulent, 20–25 mm long, 5–8 mm broad (or broader). Fl. May–June; fr. from June.

Sands.— Centr. Asia: Ar.-Casp. Endemic. Described from the Aral Sea. Type in Leningrad.

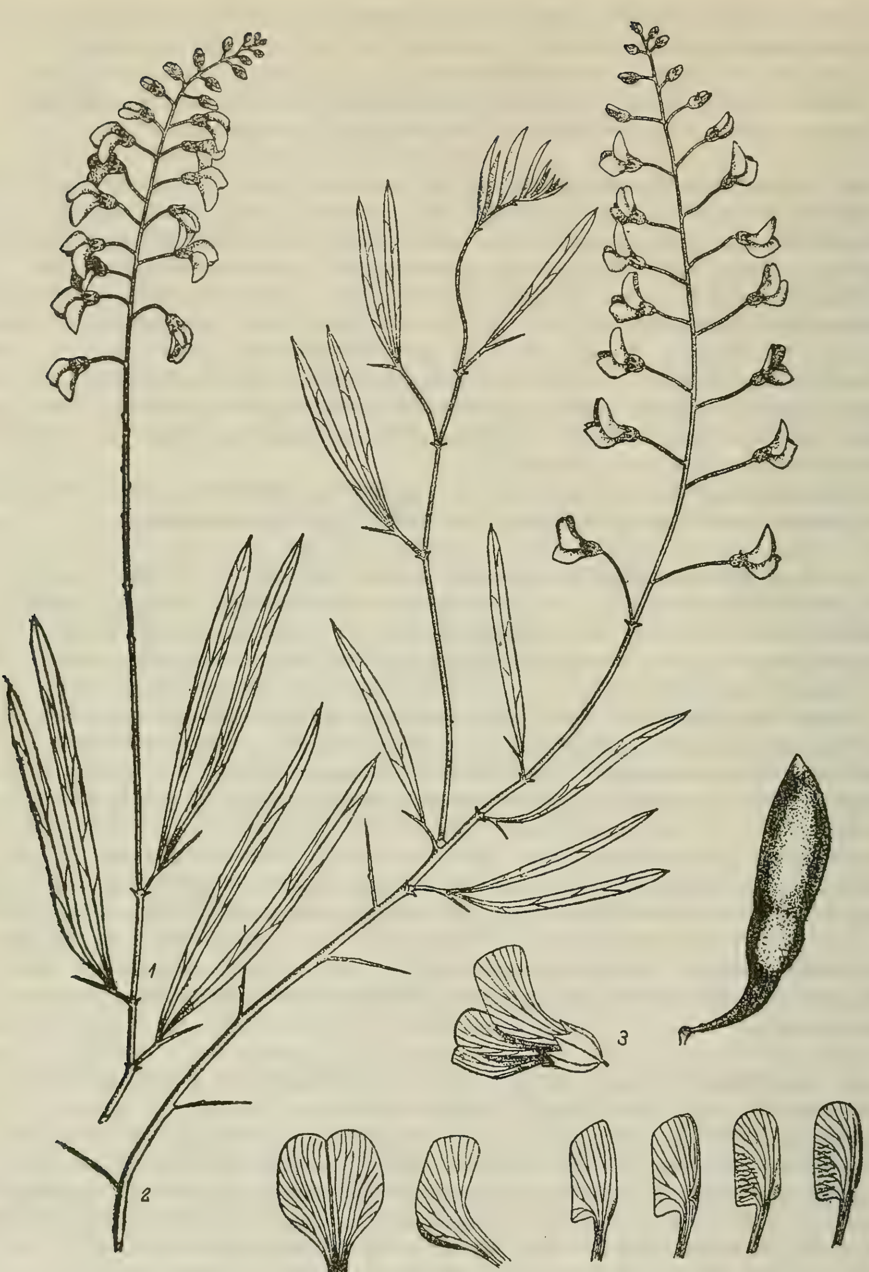

PLATE II. 1—Ammodendron conollyi Bge., branchlet and raceme; 2—A. longiracemosum H.Ra., branchlet and raceme; 3—Sophora pachycarpa C.A.M., flower, pod, and flower parts.

Genus 777. **MAACKIA** * RUPR. et MAXIM.**

Rupr. et Maxim. in Bull. Phys.-Math. Acad. Petersb. XV (1850) 128, 142.

Calyx with short and broad teeth, of these the upper 2 almost united; standard obovate; wings oblong; keel obtuse; stamens 10, distinct; ovary superior, many-ovuled; pods linear, compressed. A small tree or shrub with imparipinnate leaves. A monotypic genus, related to the American genus Cladrastis.

1. **M. amurensis** Rupr. et Maxim. in Bull. Phys.-Math. Ac. Petersb. XV (1856) 128; Rupr. in Maxim. Prim. Fl. Amur. (1859) 87. — Cladrastis amurensis Benth. Gen. Pl. I (1862—1867) 554; Kom., Fl. Manchzh. II (1904) 569.

A shrub 1.5—5 m high or tree up to 10—25 m high, reaching an age of 200—250 years and trunk diameter of 40 cm, with a dense top, the straight trunk covered with light brown, shining, and partly peeling bark; lenticels tuberculate, in groups of several; young branchlets and leaves densely covered with silky fugacious pubescence; inner bud-scales rounded-obtuse, golden-ferruginous, velutinous-puberulent; outer bud-scales smaller, brown, shining, glabrous, slightly ciliate on the margin; mature leaves imparipinnate, 10—30 cm long; leaflets 3 pairs, ovate to elongate-ovate, acutish to obtuse, cuneate or rounded at base, slightly revolute at margin, dark green above, light green beneath, with 3—6 pairs of prominent and some obsolescent veins; inflorescence a dense raceme, 15—18 cm long; pedicels ca. 3 mm long; calyx antrorsely appressed-hairy, 5-toothed, the 2 upper teeth united; petals white; standard obovate, 10—11 mm long and 6 mm broad, deeply notched, gradually tapering to a claw; keel and wings about equaling the standard; stamens connate at the very base; pods linear, compressed, 4—6 cm long and 1—1.4 cm broad, dark brown, 3-ribbed along the upper margin. July; fr. September. (Plate III, Figure 2).

Banks of rivers and rivulets, on rocky or stony soil, wood margins, turfy slopes, and thickets. — Far East: Uss., Ze.-Bu., Okh. **Gen. distr.**: Jap.-Ch. (Manchuria). Described from the Amur. Type in Leningrad.

Economic importance. Heartwood very firm, beautiful, dark coffee-colored; sapwood bright yellow; tannin content 1.64 % in the heartwood, 11 % in the bark. The wood is rot-resistant and is considered by the Chinese as particularly suitable for pit props. Highly valued for cabinet making, veneers, wooden parts of instruments, and for high finish in turnery.

The plant deserves wide distribution as ornamental. It fruits profusely under the climatic conditions of Moscow and Leningrad. Suitable for consolidation of slopes and gullies. (Prof. Strogii, Derev'ya i kustarniki Dal'nego Vostoka [Trees and Shrubs of the Far East], 1934).

Biology. The tree is shade-tolerant and regenerates easily from suckers arising close to the trunk. The leaves unfurl later than those of any other tree. The seeds have high germinating power throughout the distribution area, except in the northernmost part where the seeds do not always attain maturity.

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* Named for the Siberian teacher and explorer of the Far East, Richard Karlovich Maack, December 1886.

** Treatment by B.K. Shishkin.

Tribe 2. PODALYRIEAE Benth. in Ann. Wien. Mus. II (1838) 65. — Stamens distinct; leaves simple or digitate; shrubs or herbs.

Genus 778. **PIPTANTHUS** * D. DON **

D. Don in Sweet, Brit. Flow. Gard. (1828) t. 264.

Calyx campanulate, with short broadly deltoid or triangular teeth; standard emarginate; keel round-tipped; wings narrowly clawed, equaling the standard; stamens all distinct, with flattened filaments; pod short-stipitate, compressed, cuspidate, 1-loculed, few-seeded; seeds reniform to rounded-reniform. Shrubs; leaves entire or ternate, silvery-gray with appressed hairs; flowers in racemes.

The genus contains 7 species, one Himalyan and 6 Chinese-Mongolian. Only one species occurs in the USSR.

1. **P. nanus** M. Pop. in Bull. of Appl. Botany, Genetics a. Plant Breeding, XXVI, No. 3 Append. I (1931) 1—2. — Ic.: Ibid., Fig. No. 22 ad pag. 69.

A much branched subspherical shrub; branches stoutish, flexuous, covered with yellowish bark; young branchlets densely grayish-pubescent; 37 stipules small, inconspicuous, aculeiform; leaves numerous, densely silvery-puberulent, broadly elliptic, sometimes subovate, short-acuminate, cuneate to almost rounded at base, 3-veined, 1.5—3 cm long and 1—2 cm broad, the petiole one-sixth to one-quarter length of blade; flowers 4—15 in short dense racemes at ends of branches; pedicels scarcely longer than calyx, glabrous, bracteate at base, with a minute bracteole about the middle; calyx almost regular, glabrous, with 5 short triangular teeth; stamens all distinct; corolla to 2 cm long; pod short-stipitate, oblong, 3—5 cm long and 1—1.5 cm broad, 2—4-seeded, sparsely hairy or glabrous, round-tipped, bulging about the seeds, the sutures sparingly pubescent; seeds large, 6—8 mm long (immature), olivaceous-green. June (?).

Stony slopes. — Centr. Asia: T. Sh. **Gen. distr.**: Kashg. Described from the Kyzyl-su River near the village of Shor-bulak in Kashgaria. Type in Leningrad.

Note. In the USSR known from an incomplete specimen (lacking flowers and fruit) from central Tien Shan, according to Sovetkina.

Economic importance. Apparently a promising ornamental shrub.

Genus 779. **THERMOPSIS** † R. BR. ††

R. Br. in Ait. Hort. Kew., ed. 2, III (1811) 2.

Flowers yellow, bracteate, in a terminal raceme; calyx subcampanulate, irregular, the 2 upper teeth united and much shorter than the 3 lower; wings equaling standard; keel-petals coherent only in upper part; stamens all distinct; pod 1-seeded, flat, dehiscing into 2 valves; young leaves conduplicate. Perennial herbs with palmately 3-foliolate leaves.

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* From Greek piptein — to fall, and anthos — flower.

** Treatment by B.K. Shishkin.

† From Greek thermos, and opsis, literally "resembling lupin."

†† Treatment by E.I. Steinberg.

Note. Analyses carried out in the chemical laboratory of the Raw Material Division at the Komarov Botanical Institute of the USSR Academy of Sciences have shown that all species of the genus Thermopsis R. Br. contain alkaloids.

1. Flowers in racemes opposite . . . . 2.
+ Flowers alternate . . . . 4.
2. Leaflets oblong; bracts and calyx appressed-hairy; ovary 16–18-ovuled . . . . 3.
+ Leaflets oblong-obovate or elliptic; bracts and calyx covered with long spreading hairs; ovary 4–8-ovuled . . . . . 1. **T. alpina** (Pall.) Ldb.
3. Leaflets 4–5 times as long as broad; pods usually erect or slightly arched-recurved . . . . 2. **T. lanceolata** R. Br.
+ Leaflets 7–8 times as long as broad; pods strongly arched-recurved. Central Asia . . . . 3. **T. turkestanica** Gdgr.
4. Corolla 20–25 mm long; stipules 20–50 mm long and 15–30 mm broad, sessile, ovate or broad-oval. Far East . . . . 6. **T. fabacea** (Pall.) DC.
+ Corolla 25–30 mm long; stipules oblong-lanceolate or lanceolate. Central Asia . . . . 5.
5. Calyx teeth one-third to half as long as the tube; pods 5–6 cm long, thick-walled, silky-villous, usually erect, the seed compartments not evident . . . . 4. **T. alterniflora** Rgl. et Schmalh.
+ Calyx teeth one-quarter to one-third as long as the tube; pods 9–12 cm long, arched-recurved, appressed-pubescent, the seed compartments prominent . . . . 5. **T. dolichocarpa** V. Nikitin.

1. **T. alpina** (Pall.) Ldb. Fl. Alt. II (1830) 112; Ldb. Fl. Ross. I, 510; Kryl., Fl. Zap. Sib. VII (1933) 1583; Vasil'chenko in Sov. Bot. No. 3 (1936) 46; Fl. Tadzh. V (1937) 145. – Sophora alpina Pall. Spec. Astragal. Descr. (1800) 121, tab. 90, f. 1. – Podalyria alpina Willd. Enum. Hort. Berol. Suppl. (1813) 22. – Thermopsis corgonensis DC. Prodr. II (1825) 99. – Ic.: Pall. l. c.; Sov. Bot. 3 (1936) 47, Fig. 1 (fruit and seed).

Perennial; rhizome long, slightly branched, 4–10 (15) mm in diameter; stems usually several, 12–30 cm long, erect or ascending, slightly angled, covered with long silky slightly implexed white hairs; sheaths on lower part of stem to 10 mm long, tubular, 3-toothed, brown, the lower glabrous, the upper covered with long silky white hairs; leaf petioles 3–8 mm long; leaflets oblong-obovate or elliptic to subovate, acuminate, 2–3.5 cm long and 8–20 mm broad, green, covered on both sides with long soft spreading implexed hairs, more densely beneath, the margin ciliate; stipules ovate or broadly lanceolate, acute, 20–30 mm long and 10–20 mm broad, the indument on both surfaces resembling that of the leaves; inflorescence a rather loose terminal raceme 5–12 cm long; flowers yellow, in twos or threes in 1–3 opposite whorls; bracts resembling stipules in shape and indument; calyx campanulate, patulously long-hairy, 10–17 mm long, the lanceolate lower teeth about as long as the tube; standard including claw ca. 19–28 mm long, 17–27 mm broad, the claw 5–9 mm long, the rounded-ovate or subreniform limb emarginate; wings about equaling standard, 9—12 mm broad, rounded at apex; keel 20—21 mm long and 6—8 mm broad, shorter and narrower than the wings; ovary 4—8-ovuled; pods usually light cinnamon, flat, oblong-elliptic, often constricted between the seeds, 2—6 cm long and 1.5—1.8 cm broad, covered with long spreading and somewhat implexed hairs, the style persistent as a long beak; seeds 5—6 mm long and 3—4 mm broad, reniform, more or less compressed, brownish cinnamon, with a white hilum. June—July. (Plate III, Figure 1).

The alpine zone of moss-and-lichen and gravelly lichen tundras, rocks, stony slopes, rock streams, riverside meadows, and turfy slopes, reaching the snowline (nearly to 4,000 m above sea level), also penetrating into the subalpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.**: Dzu.-Kash., Mong. Described from the Korgonskie Mountains in Altai (Shangin's collections). Type in London; cotype in Leningrad.

2. **T. lanceolata** R. Br. in Ait. Hort. Kew. ed. 2, III (1811) 3; DC. Prodr. II, 99; Ldb. Fl. Alt. II, 112; Ldb. Fl. Ross. I (1842) 510; Turcz. Fl. baic.-dahur. I, 273; Kryl., Fl. Zap. Sib. VII (1933) 1582; Vasil'chenko in Sov. Bot. 3 (1936) 46. — Sophora lupinoides Pall. Spec. Astr. Descr. (1800) 119, non L. — Thermopsis lupinoides Link Enum. Hort. Berol. I (1821) 401; Fl. Yugo-Vost. V (1931) 562. — Ic.: Pall. l. c., tab. 89; Sorn. rast. SSSR, III (1934) 153; Sov. Bot. No. 3 (1936) 47, Fig. 2 (fruit and seed). Exs.: HFR No. 409. Vernacular name: p'yanaya trava ["drunk herb"].

Perennial; rhizome long, branched, 3—5 mm thick; stem 10—30 (40) cm long, erect, simple or branched, sulcate, covered with long whitish appressed and some subpatulous hairs; sheaths on lower part of stem short, 3-toothed, the lowermost smooth, stiffly membranous, brownish; leaf petioles 4—7 mm long; leaflets oblong, obtuse to subacuminate, 3—6 (7) cm long and 5—12 mm broad, grayish green, the upper surface glabrous except at margin and sometimes on midrib, the underside covered with long appressed and somewhat ferruginous hairs; stipules ovate-lanceolate, those of upper leaves lanceolate and greatly exceeding petiole; inflorescence a rather loose terminal raceme 5—15 cm long; flowers in twos or threes; bracts oblong-ovate, acuminate, appressed-pubescent above and beneath; calyx appressed-
40 hairy, to 15—18 mm long, the lanceolate lower teeth about as long as the tube; standard ca. 25—28 mm long and 17—21 mm broad including claw, this 5—8 mm long, the suborbicular limb deeply and narrowly notched; wings about equaling standard, linear-oblong, 5—6 mm broad; keel slightly shorter to slightly longer than wings and one and a half times to twice as broad; ovary short-stipitate, 16—18-ovuled; pods oblong-linear, strongly flattened, appressed-pubescent, 50—60 mm long and 8—10 (15) mm broad, usually erect or slightly arched-recurved, the seed compartments prominent, the style persistent as an abrupt long beak; seeds ca. 3.5—4 mm long and ca. 3 mm broad, subovoid, greenish black, pruinose, with light-colored hilum. June—July.

Occurring in large groups in steppes, often saline, steppe slopes, sometime stony, sandy places, and river valleys; often a weed of field crops, especially of wheat, gullies, and roadsides. — European part: V.-Kama, Transv.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. **Gen. distr.**: Dzu.-Kash., Mong. (N. part), Jap.-Ch. Described from Siberia.

Economic importance. Thermopsis has application in Tibetan medicine. According to Shcherbakov and Sibirtseva, the plant provides a very promising expectorant, superior in its effect to ipecac and other imported agents (cited from Vasil'chenko, O vidakh roda Thermopsis flory SSSR [Species of the Genus Thermopsis in the USSR Flora], Sov. Bot., No. 3, 1936).

Note. Thermopsis lanceolata R. Br. is very poisonous. The seeds have harmful effects when present as impurity in flour to the extent of 20.5% [?] by weight. The plant is avoided by livestock. According to M. N. Varlakov (Materialy k izucheniyu novykh alkaloidonosnykh rastenii Sibiri [Studies of New Alkaloid-containing Plants of Siberia], Sov. farmats. 1 (1933), 11 and 12 (1933), infusions and extracts of T. lanceolata R. Br. as well as the alkaloid thermopsin derived from it, act chiefly on the medulla oblongata and cerebrum, more particularly on vomitory, respiratory and vasomotor centers; the effect on the living organism ranges according to dosage from tonic and stimulant to depressive and paralyzing or even fatally asphyxiant. The direct and reflex effects of small doses of thermopsine on the vomitory center are associated with increased secretion of the mucous membranes of the respiratory tract and are thus conducive to expectoration (cited from Vasil'chenko, l. c.).

3. **T. turkestanica** Gdgr. in Bull. Soc. Bot. France t. 60 (1913) 462.

Perennial; stem sturdy, 30–50 cm long, sulcate, glabrous in lower part, appressed-puberulent about the middle, more heavily pubescent in inflorescence; branches numerous, appressed to stem; sheaths at base of stem as in T. lanceolata R. Br.; leaf petioles 3–5 mm long; leaflets oblong-lanceolate, acuminate, (24) 35–80 (90) mm long and (4) 6–12 mm broad (seven to eight times as long as broad), green, glabrous above, minutely appressed-puberulent beneath (apparently glabrous without magnification); stipules oblong-lanceolate, greatly exceeding petiole, the indument as that of leaves; inflorescence a rather loose terminal raceme 6.5–13.5 cm long; flowers in twos or threes; bracts narrowly lanceolate, acuminate, minutely appressed-puberulent on both sides; all flower parts resembling those of T. lanceolata R. Br. in both shape and size; ovary densely silvery-pubescent, 16–18-ovuled; pods oblong-linear, flattened, strongly arched-recurved, light cinnamon, with prominent seed compartments, 4.5–7 cm long and 0.8–1.0 cm broad, the minute appressed hairs invisible without magnification; seeds as in T. lanceolata R. Br. May–July.

Mountain zone, riverbanks, turfy slopes and meadows, and chee-grass thickets. — Centr. Asia: T. Sh. Endemic. Described from the Tekes River valley. Regel, 1879. Type in Leningrad.

Note. T. turkestanica is very closely related to T. lanceolata from which it differs in more vigorous growth, more profuse branching, indument of the fruit, and leaf length to width ratio. Field observations are needed for precise determination of distinguishing characters.

4. **T. alterniflora** Rgl. et Schmalh. in Izv. obshch. lyubit. estestvozn., antropol. i etnogr. XXXIV, 2 (1882) 18; Sorn. rast. SSSR, III (1934) 154. — T. rigida Vass. in Sov. Bot. No. 3 (1936) 47; Sov. Bot. No. 6 (1936) 160. — Ic.: Sov. Bot. No. 3 (1936) 47; Fig. 3 (fruit and seed).

Perennial; rhizome strong; stems erect, sturdy, 40–70 cm long, angled, branched, glabrous in lower part, sparsely hairy in middle part, covered in inflorescence with somewhat implexed subpatulous white hairs; petioles 15–22 mm long; leaflets oblong-elliptic or oblong-lanceolate, acuminate, cuneate at base, 25–50 (60–75) mm long and 11–18 (30) mm broad, glaucescent, glabrous above, minutely appressed-hairy beneath; stipules lanceolate, equaling or exceeding petiole; inflorescence a loose terminal raceme, 9–20 (30) cm long, of alternate or very rarely paired flowers; bracts oblong-lanceolate, at anthesis exceeding petiole, appressed-pubescent externally, glabrous within; calyx grayish with dense appressed hairs, the triangular-lanceolate lower teeth one-quarter to one-third as long as the tube; standard including claw 25–30 mm long and about as broad, the suborbicular limb slightly emarginate, gradually passing into the claw, this ca. 5 mm long; wings and keel somewhat shorter than standard; wings 42 27–28 mm long and 10–11 mm broad, the claw ca. 10 mm long; keel 27–28 mm and 8–9 mm broad, with claw ca. 10 mm long; ovary on stipe 5–6 mm long, linear, silky with dense appressed pubescence; pods erect, oblong-ellipsoid, sometimes slightly enlarged toward base, gradually tapering to a beak, few-seeded, coarse-walled, silky-villous with appressed hairs, 30–55 mm long and 11–13 mm broad, the subulate beak mostly breaking off in mature pods; seeds reniform, light cinnamon-greenish, to 5–6 mm long, 3–4 mm broad, dull, smooth, the hilum round and light-colored, the radicle not prominent. May–June.

Foothills and mountains, slopes, valleys and banks of mountain streams, rising to 3,600 m, infesting unirrigated crops. — Centr. Asia: Syr D., T. Sh. (W. part). Endemic. Described from Centr. Asia (Mt. Karamkul' — 1870, Krause's collections). Type in Leningrad.

5. **T. dolichocarpa** V. Nikitin in Fl. Tadzhik. V (1937) 651, appendix 146; Vasil'chenko in Sov. Bot. No. 3 (1936) 47. — T. alterniflora Rgl. et Schmalh. in Izv. obshch. lyubit. est., antrop. i etnogr., XXXIV, 2 (1882) 18 p. p. — Ic.: Fl. Tadzhik. V (1937) 147 and 148 (chart); Sov. Bot. No. 3 (1936) 47, Fig. 4 (fruit and seed).

Perennial; rhizome strong, woody; stems solitary to several, 30–80 cm long, erect, branched, sulcate, sparsely covered with short soft subpatulous hairs; sheaths on lower part of stem more or less united, tubular, brown, smooth, 1–3 (4) cm long, the lowest imbricate; stipules slightly shorter to slightly longer than petiole, oblong-lanceolate, rarely oblong-oval, acute, 1.5–4.5 cm long and 0.5–2 cm broad; petioles 22–42 mm long; leaflets oblong-oblanceolate (the upper lanceolate), obtuse to acute, cuneate at base, 2–6 cm long and 0.7–2.5 cm broad, glabrous or sparingly puberulent above, densely appressed-puberulent with silky hairs beneath; flowers alternate, on pedicels 5–10 mm long, in a rather loose spiciform terminal raceme 10–23 cm long, bracts oblong-lanceolate, 14–18 mm long and 4–6 mm broad, appressed-hairy outside, glabrous or rarely and sparsely puberulent within; calyx tubular-campanulate, straight, 1.1–1.5 cm long, densely silky-pubescent with appressed gray hairs; teeth triangular, acute to obtusish, one-quarter to one-third as long as the tube; standard 25–30 mm long including claw, 15–20 mm broad, about equaling wings, the suborbicular-ovate slightly emarginate limb gradually passing into the claw, this 9–11 mm long; wings 27–30 mm long and 5–7 mm broad, with claw 10–11 mm long; 43 keel 27–28 mm long, rounded at apex; ovary short-stipitate, 15–18-ovuled, densely covered with soft white hairs; pods linear, flattened, 9–12 cm long and 0.8–1.1 cm broad, light cinnamon, with prominent seed compartments, erect or slightly recurved, appressed-puberulent, gradually tapering to a subulate beak, this breaking off in mature pods; seeds oblong-ovate, greenish brown, 4–5 mm long and 3 mm broad, smooth, with prominent radicle and a light-colored hilum. May–August.

"Distributed chiefly in the mid-montane region, at altitudes of (800) 1,500–2,650 m, in the timber-scrub and rosarium-scrub vegetation zones, most commonly in rosaria, less frequently in maple and almond communities; penetrating into the lower part of the subalpine zone, where it enters into the composition of subalpine and related meadow communities such as mixed grass and orchardgrass-foxtail; rarely descending into the ephemeral vegetation zone, especially on slopes facing north; a weed infesting non-irrigated plowland and fallows, in some places widespread" (Fl. Tadzh. V, 146). — Centr. Asia: Pam.-Al. Endemic. Described from the Bal'dzhuan. area. Type in Leningrad.

Economic importance. A quarantine wood; not eaten by animals. Presence as impurity in grain is liable to result in poisoning.

6. **T. fabacea** (Pall.) DC. Prodr. II (1825) 99; Ldb. Fl. Ross. I, 511; Kom. Fl. Manchzh. II, 571; Kom., Fl. Kamch. II, 273; Hultén Fl. Kamtch. III, 93; Kom. and Alis., Opred. rast. Dal'nevost. kr. II, (1932) 661; Vasil'chenko in Sov. Bot. No. 3 (1936) 49. — ? Sophora lupinoides L. Sp. pl. (1753) 374. — Podalyria lupinoides Willd. Sp. pl. II (1799) 504. — S. fabacea Pall. Sp. Astr. Descr. (1800) 122. — Ic.: Pall. Spec. Astr. Descr. (1800) tab. 90; Somoku Dzusetsu Ed. Makino (Iconograph. pl. Nippon), XIII (1912) Tab. 32. — Vernacular name: kuzhmazhut.

Perennial; rhizome strong, 6–10 mm in diameter; stems 1–5, to 50 cm long, sulcate, glabrous in lower part (notably in old specimens), sparsely covered in middle part and somewhat more densely in inflorescence with soft white spreading implexed hairs, rarely glabrous; leaves at base of stem sheathing, marcescent; petioles of median and upper leaves 20–42 mm long; leaflets broad-elliptic, cuneate at base, 40–70 mm long and 15–35 mm broad, glabrous above, covered beneath with white spreading implexed hairs, appressed-hairy when young; stipules broad-oval or ovate, sessile, shorter than petiole, 20–50 mm long and 15–30 mm broad; inflorescence a loose terminal raceme 5–18 cm long, the alternate flowers on pedicels 5–10 mm long; bracts lanceolate, 8–15 mm long and 3–5 mm broad, covered externally and marginally with silky white appressed hairs, glabrous within; calyx campanulate, covered with white appressed hairs, more densely so at tooth margins, to 10 mm long, the lanceolate lower teeth one-third as long as the tube; standard ca. 20–23 mm long including claw and 20–24 mm broad, somewhat shorter than wings and keel, the rounded limb deeply and broadly notched, the claw 4–6 mm long and to 3 mm broad; wings oblong, 20–25 mm long and 10–12 mm broad; keel 21–23 mm long and 8–9 mm broad; ovary densely covered with white silky appressed hairs, short-stipitate, many-ovuled; pods linear, 30–90 (110) mm long and 5–8 mm broad with prominent seed compartments, sparsely puberulent, light to dark cinnamon, gradually tapering to a beak; seeds 3–3.5 mm long and 2–3 mm broad, compressed, suborbicular-reniform, dark cinnamon, shining. June–August.

Sandy seashores and riverbanks. — Far East: Kamch., Uda, Uss., Sakh. Gen. distr.: Ber., Jap.-Ch. Described from Kamchatka. Type in London.

Tribe 3. GENISTEAE Bronn. Diss. Legum. (1822) 132. — Stamens united, monadelphous or diadelphous; leaves simple or compound with 3—5 entire leaflets. Shrubs.

Genus 780. **LOTONONIS** * DC.**

DC. Prodr. II (1825) 166; Eckl. et Zeyh. Enum. (1835) 176. — Leobordea Del. Voy. Arab. Petr. (1833) 86.

Calyx deeply 5-parted, the lobes subequal, acute; corolla glabrate; petals unguiculate; standard ovate, pubescent on the back; wings oblong, obtuse; keel curved, obtuse; filaments united into a tube, this truncate at summit; style filiform, glabrous; pod gibbous at base, sessile. Undershrubs with trifoliolate leaves and paired stipules; flowers few.

1. **L. genistoides** (Fenzl) Benth. in Hook. Lond. Journ. Bot. II (1843), 607; Boiss., Fl. Or. II, 31; Grossg., Fl. kavk. II, 248. — Leobordea argyrolobioides Jaub. et Spach in Ann. Sc. Nat. Ser. II (1843) 237. — L. genistoides Fenzl, Pugil. Pl. Nov. Syr. (1842) 6, No. 13 (lapsu calami — Leobordea lotoides); Jaub. et Spach in Ann. Sc. Nat. Ser. II (1843) 236. — L. sericea Ldb. Fl. Ross. I (1842) 512. — Ic.: Jaub. et Spach Ill. or. III, tab. 256.

Perennial; root stout; stem woody in lower part, branched; branches to 47 35 cm long, erect, branched at the ends, silvery with appressed hairs; leaflets oblong-obovate, cuneate at base, acuminate, the middle to 10 mm long and 4 mm broad, the lateral shorter and narrower, all densely silvery-pubescent; petioles 1.5 mm long, heavily pubescent; stipules acutely lanceolate, 2.5 mm long; peduncles to 2 cm long, axillary; flowers 1—4, short-pediceled, forming an umbel, sometimes verticillate, subtended by opposite ternate bracts with narrow segments; calyx ribbed, pubescent, dissected to two-thirds into a sublinear acute lower lobe and a pair of subequal upper lobes ca. 1 cm long, each of these cut to one-quarter into 2 acute teeth; corolla yellowish rose; standard ovate, subcordate at base, 9 mm long including claw and 4.5—5 mm broad, the claw to 2 mm long; wings oblong, rounded at tips, obscurely auriculate, clawed, 8 mm long and 2 mm broad; keel coherent at tip, 1 cm long, with claw 3 mm long, strongly curved, with minute auricles and an obtuse beak; filaments united to three-quarters their length; style curved; pod flat, cuneate-obovate, appressed-pubescent, gibbous on lower side, the beak recurved; seeds 1 or 2, reniform, tuberculate. July.

Scrub on dry slopes. — Caucasus: S. Transc. **Gen. distr.**: Arm.-Kurd., As. Min. Described from the Taurus Mountains. Cotype in Leningrad.

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* Derived from the generic names Ononis and Lotus.

** Treatment by A.S. Lozina-Lozinskaya.

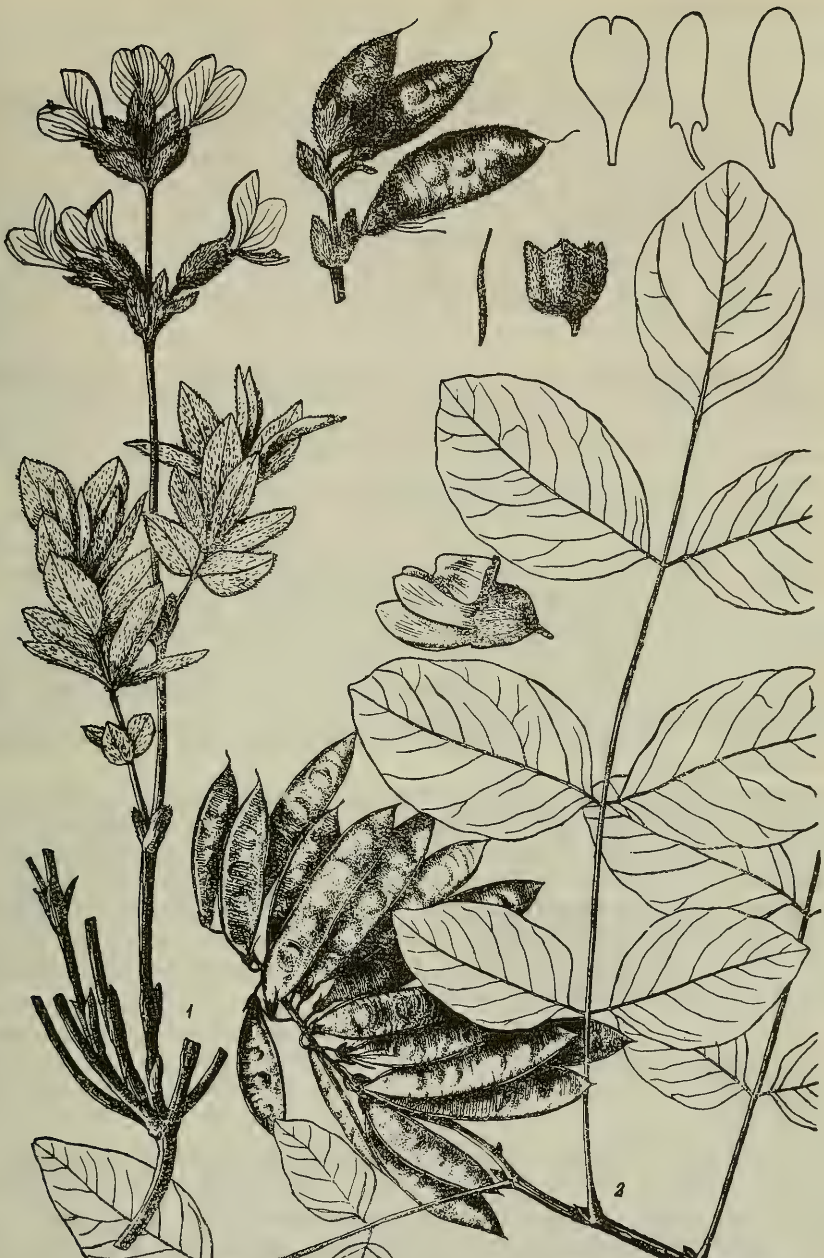

PLATE III. 1 – *Thermopsis alpina* (Pall.) Ldb., habit, fruits; 2 – *Maackia amurensis* Rupr. et Maxim., branchlet with fruits; flower toward end of flowering period; calyx, ovary, corolla parts.

Genus ★**CROTALARIA**[*] L.[**]

L. Sp. pl. (1753) 717.

Calyx with campanulate tube and 5 equal or subequal lobes; standard orbicular or ovate, with a basal callosity; wings oblong-elliptic, shorter than standard; keel curved, angular on the back, acuminate; stamens dimorphous, all connate at base into a tube, distinct above, 5 of them with large elongated elliptic anthers, the other 5 with smaller globose anthers; ovary sessile, pubescent, with a long strongly recurved style; pod broad or oblong, strongly inflated; seeds reniform. Herbs or shrubs; leaves simple or 3-foliolate rarely with 2—7 pairs of leaflets; flowers in racemes, with small pubescent bracts.

1. **C. juncea** L. Sp. pl. (1753) 714; Pereverzev in Sots. rastenievodstve II (1934) 131; Idem in Tr. prikl. bot, gen. i sel., Ser. XI, I (1936) 59. — Ic.: Pereverzev 132, 133 (1934) 62—64, 67, 77 (1936).

Biennial; stem erect, branched, more or less angled, green, densely pubescent, to 2—3 m long; leaves light green or green, subsessile with 48 short light green petiole, simple, entire, silky-pubescent on both surfaces, the petiole flanked by a pair of small peltate stipules; flowers terminally racemed; corolla large, yellow; standard obtuse, with 2 cherry-colored tubercles at base, channeled at center; wings elongate-oval, yellow, cinnamon-spotted at base; keel pale yellow, tightly enclosed, acuminate, the tip coiled anticlockwise; ovary green, heavily white-pubescent; pod oblong, light green, densely pubescent; seeds reniform, flat, shining or dull, dark gray with brownish or greenish tones.

Cultivated. — Caucasus: W. Transc.; Centr. Asia: Syr D. Originating from tropical Asia.

Economic importance. Cultivated since ancient times as a fiber plant. The fiber compares favorably with jute and kenaf and is considered as one of the best bast fibers. It is used in England like hemp for cordage, ropes, and sacking. It is known in the trade as San-hemp (sunn hemp), Indian hemp, false hemp, and Bombay hemp. In the conditions of the Tashkent District and Adzharistan (Batumi) it gives two harvests, with yield averaging 9 to 12% fiber for air-dry weight. Owing to its chemical composition, the plant is of definite interest as green manure.

Genus **LUPINUS**[†] L.[††]

L. Sp. pl. ed. 1 (1753) 721.

Calyx uncolored, deeply bilabiate, the upper lip 2-toothed, the lower 3-toothed; standard oval, with revolute margins; wings firmly enveloping the keel; keel semifalcate, strongly attenuate toward tip; filaments united at base into a tube, distinct above; ovary pubescent; style curved, overtopping anthers; stigma capitate, surrounded by hairs; pod elongated, leathery, firm, pubescent, more or less flattened, 2–many-seeded, with oblique cross-partitions between the seeds; seeds rounded-angular, of various colors. Annuals or perennials, rarely undershrubs, with alternate digitate leaves; leaflets stellately disposed, usually elongate-oval to narrowly linear-lanceolate, glabrous or pubescent, with long petiole and elongate stipules. Russian name: lupin.

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[*] From Greek — crotalon, rattle, ratchet.

[**] Treatment by I. V. Palibin.

[†] Name derived from Latin lupus — wolf.

[††] Treatment by I. V. Palibin, based on the work of P. M. Zhukovskii.

Plants of considerable agricultural value, mostly native in North America and partly in the Mediterranean region. Lupins are grown as green manure, yielding up to 100 tons of herbage per hectare. Lupins contain a large amount of protein and toxic alkaloids which cause so-called lupin poisoning [lupinosis] in animals. To avoid poisoning, the seeds must be subjected to a special steaming treatment followed by leaching in water. A meal made of lupin seed contains 4–6% nitrogen and 1.4% phosphoric acid; it is used for fertilizing a variety of crops.

The main areas of lupin cultivation in the USSR are Belorussia and parts of the Ukraine.

The agriculturally most important species are the following:

1. Leaflets elongate-linear, 1–3 mm broad; pods inflated . . . . 1. **L. angustifolius** L.
+ Leaflets lanceolate . . . . 2.
2. Flowers yellow; pods inflated . . . . 2. **L. luteus** L.
+ Flowers usually white, rarely blue or roseate . . . . 3.
3. Corolla mostly white, twice as long as calyx; leaflets 7–9, obtusish, pubescent beneath . . . . 3. **L. albus** L.
+ Corolla mostly blue, about three times as long as calyx; leaflets 9–16, commonly acuminate, glabrous above . . . . 4. **L. polyphyllus** Lindl.

1. **L. angustifolius** L. Sp. pl. (1753) 721; Boiss., Fl. Or. II, 28; Hegi III. Fl. IV, 3, 1158; Zhukovskii in Tr. po prikl bot., gen. i sel. XXI (1929) 267.– Ic.: Sibth. Fl. Graec. tab. 685; Hegi, l. c., f. 1312; Zhukovskii, l. c., 269; Libkind, Lupin (1931) 51–52, Figs. 35–36.

Annual with erect stem; stems and leaves slightly pubescent; leaflets 7–9, elongate-linear, 1–3 mm broad, channeled, glabrous above, appressed-pubescent beneath; stipules linear-subulate, recurved; inflorescence compact; flowers alternate; pedicels very short; bracts shorter than flower, obovate, pointed, deciduous; calyx bracteate, the upper lip 2-lobed, the lower subentire with 2 or 3 obsolescent teeth; corolla ranging in color from white to violet; pods inflated, 4–6-seeded; seeds subovate, with a depression, earthy-brown, ashy-marbled.

Cultivated in many countries of W. Europe; in the USSR in the Ukraine and in Belorussia. **Gen. distr.**: Mediterranean region.

2. **L. luteus** L. Sp. pl. (1753) 722; Ov. i Sit., Opyt russko-kavk. fl. (1858) 400; Hegi, III. Fl. IV, 3, 1156; Zhukovskii in Tr. prikl. bot. gen. i sel. (1929) 260; Libkina, Lupin (1931) 53.– Ic.: Curt. Bot. Mag. tab. 140; Sibth. Fl. Graec., tab. 686; Hegi, l. c. f. 1310; Libkind, l.c., Figs. 37–38.

Annual; stem sulcate, hairy, sparsely leafy, in cultivated plants with profuse foliage; petioles long; leaflets 9 (8–11), elongate-obovate, narrowly tapering toward base, abruptly mucronate, densely clothed on both sides with appressed whitish hairs; stipules paired, narrow, falcate, scarious at base; inflorescence terminal, elongated; flowers verticillate; pedicels very short; corolla twice as long as calyx, very fragrant; bracts obovate, half length of calyx, obtusish, readily deciduous; upper lip of calyx 2-lobed, lower lip obtusely 3-toothed; pods elongated, flattened, 3—5-seeded; seeds rounded-reniform, compressed, rosy-brown, black-dotted or marbled.

Cultivated in W. Europe; in the USSR in western parts of the Ukraine and Belorussia. **Gen. distr.**: W. part of the Mediterranean region.

3. **L. albus** L. Sp. pl. (1753) 1015; Ov. i Sit, Opyt russko-kavk. fl. (1858) 401; Zhukovskii in Tr. po prikl. bot. XXI (1929) 270; Libkind, Lupin (1931) 56; Hegi, Ill. F. IV, 3, 1153. — Ic.: Zhukovskii, l. c., Fig. 13 and 13a; Hegi, l. c., Fig. 1307.

Annual, densely clothed throughout with soft appressed white hairs; stems few, stout, erect, to 2 m long; leaflets 7—9, about equaling petiole, elongate-obovate, subobtuse, glabrate above, villous beneath, the margins softly woolly; stipules subulate, adnate through one-third to calyx; inflorescences terminal, subsessile, short, few-flowered; flowers alternate on pedicels 1—2 mm long; bracts elongate, obtusish, deciduous; calyx lips subequal, the upper entire, smooth, 2-toothed, the lower obscurely 3-toothed or entire; corolla twice as long as calyx; petals subequal, white to dark azure or roseate; pods to 8—11 cm long; subcylindric, 5- or 6-seeded; seeds compressed, angular-reniform, with submammiform hilum.

Cultivated in the Mediterranean region and in Germany; in the USSR confined to Georgia. **Gen. distr.**: Mediterranean region.

4. **L. polyphyllus** Lindl. Bot. Reg. (1827) 1096; Ov. i Sit. Opyt russko-kavk. fl. (1858) 403; Hegi, Ill. Fl. IV, 3 1154; Zhukovskii in Tr. po prikl. bot., gen. i sel. XXI (1929) 281; Libkind, Lyupin (1931) 83. — Ic.: Hegi, l. c. Fig. 1306; Zhukovskii, l. c., Fig. 16; Libkind, l. c., Figs. 57—58.

Perennial; stems woody, glabrous, shining; leaflets 13—15 (9—16), lanceolate, gradually acuminate, dark green, glabrous above, hairy beneath, the margin dark-ciliate; petiole at least twice length of leaflets; stipules subulate, hairy, often adnate to petiole for three-quarters their length; 51 inflorescences very long, conic, many-flowered; pedicels long; bracts shorter than pedicels, subulate, readily deciduous; calyx lips entire or minutely toothed; corolla three times as long as calyx, commonly blue, in some forms violet, azure, rose, or white; pods numerous, elongated, flat, black in maturity, densely appressed-canescent; seeds small, elongate-orbicular, black or cinnamon.

A well known garden plant. There are several races differing in flower color. The plant is of interest for the N. part of the USSR as a green manure, being endowed with considerable winter hardiness and giving several cuts during the summer. **Gen. distr.**: NW parts of North America.

Genus 781. **ARGYROLOBIUM** * ECKL. et ZEYH.**

Eckl. et Zeyh. Enum. (1835) 184.— Chasmone E. Mey. Comm. Pl. Afr. austr. (1835) 71.— Trichasma Walp. in Linnaea XIII (1839) 510.— Diolotus Tausch in Flora XXV, I (1842) 284.

Calyx deeply 2-parted, the upper lip 2-lobed, the lower 3-lobed; petals glabrous, short-clawed; standard suborbicular, cuneately attenuate or oboval, emarginate; wings oblong, enlarged at summit, obtuse; keel obtuse; all stamens united; style curved, glabrous; stigma flattened; pod many-seeded, attenuate at both ends, pointed, compressed, obscurely moniliform. Undershrubs; leaves 3-foliolate, petiolate, with 2 stipules; flowers solitary or in pairs at ends of branches or opposite the stem leaves, 1- or 2-bracted.

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* From Greek argyros — silver, and lobos — pod.

** Treatment by A. S. Lozina-Lozinskaya.

1. Racemes many-flowered, at ends of stem and branches . . . . 1. **A. calycinum** (M. B.) Jaub. et Spach.
+ Racemes 1–5-flowered, opposite leaves . . . . 2.
2. Plants with long procumbent branches; flowers dingy rose . . . . 2. **A. trigonelloides** Jaub. et Spach.
+ Plants to 5 cm high, with short erect branches . . . . . 3. **A. lotoides** Bge.

1. **A. calycinum** (M. B.) Jaub. et Spach Ill. Fl. or. I (1842–1843) 115; Bois., Fl. or. II, 33; Grossg., Fl. Kavk. II, 249. — Cytisus calycinus M. B. Fl. taur.-cauc. II (1808) 166. — C. pauciflorus Willd. et C. lotoides Willd. Sp. Pl. III (1800) 1126, non Pourr. — Trichasma calycinum Walp. in Linnaea XIII (1839) 511. — Chasmone calycina E. Mey. Comm. Pl. Afr. Austr. (1835) 74. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 15. — Exs.: HFR No. 207.

Undershrub to 50 cm high; roots stout; stems numerous, woody in lower part, densely clothed with spreading hairs 1 mm long; branches long, erect or recurved; leaves thin; leaflets oblong-obovate, narrowing toward base, rounded at apex or acuminate, glabrous above, heavily pubescent beneath and on the margin, borne on short heavily pubescent petiolules, the middle to 3.5 cm long and 20 mm broad, the lateral smaller; petiole usually longer than middle leaflet; stipules paired, lanceolate, strongly acuminate, to 8 mm long; flowers 7–9 in a capitate-paniculate inflorescence at ends of stems and branches, rarely in twos or threes; pedicels very hairy, to 1 cm long; bracts 2 or 3, acute, pubescent, 5 mm long; calyx densely hairy, the upper lip 12 mm long and 2.5 mm broad, with 2 oblong-lanceolate acuminate lobes, the lower lip 15–17 mm long, cut to one-third into 3 teeth, of these the middle narrow, equaling or exceeding the recurved triangular-lanceolate lateral teeth; corolla pale yellow; standard conduplicate, rounded-ovate, obtusish, narrowing toward base, 12 mm long including claw and 10 mm broad, the claw 1 mm long; wings 11 mm long and 4 mm broad, acuminate, auriculate, with claw 1 mm long; keel coherent at tip, semiorbicular, 11 mm long, with a small rounded beak; stamens equaling or shorter than pistil; ovary very hairy; pod 25–30 mm long and 4 mm broad, very hairy, prominently 8-seeded; seeds cinnamon. June–July.

Rocky and stony slopes, scrub, and wood margins in the middle mountain zone. — European part: Crim.; Caucasus: Cisc., W. and E. Transc. **Gen. distr.**: Arm.-Kurd., Iran., Bal.-As. Min. Described from Tbilisi. Type in Leningrad.

Note. Specimens from dry slopes of Adzharistan and the Trebizond district are characterized by narrower acuminate leaflets, shorter indument, smaller plant size, and the middle tooth of the lower calyx lip being shorter than the lateral ones.

2. **A. trigonelloides** Jaub. et Spach Ill. Fl. or. I (1842–1843) 116, tab. 60; Boiss., Fl. or. II, 33; Grossg., Fl. Kavk. II, 249. — Cytisus oxalidiflorus C. A. M. in sched. Herb. Petr. — Exs.: Fl. or. exs. No. 38.

Undershrub, with a strong stout root; stem branched from base; branches long, procumbent, reddish, at first covered with short appressed silvery hairs; leaves distant; leaflets firm, short-petioluled, silvery-pubescent, the middle broadly obovate, cuneate at base, rounded at apex, 8–12 mm long, to 10 mm broad, occasionally much smaller, the lateral ones inequilateral, smaller than to equaling the middle leaflet; stipules triangular, 53 acute, pubescent, 1–1.5 mm long; racemes opposite leaves and branches, the flowers borne in twos to fives on peduncles to 1 cm long; calyx deeply parted, the upper lip 6 mm long, with 2 acutely lanceolate upcurved lobes, the incurved lower lip 7 mm long, sharp-toothed to one-third; bracts at base of calyx sublinear, 1.5 mm long; corolla yellowish rose; standard darker, broad-ovate, rounded at apex, obtusish at base, folded, 10 mm long including claw, in lower part 9 mm broad; wings 9 mm long, short-clawed, to 3 mm broad, obtusish at apex, minutely auriculate; keel 7 mm long, strongly concave, coherent in upper part, 2-cleft below; style upcurved; pod 21 mm long and 3.5–4 mm broad, silvery-pubescent, with a short acute beak; seeds 7, cinnamon, shining. June–August.

Dry stony slopes.— Caucasus: S. Transc. (Armenia). **Gen. distr.**: Iran. (N. Iran). Described from plants collected by Aucher-Eloy in Mendil (Iran). Type in Paris; cotype in Leningrad.

3. **A. lotoides** Bge. in A. H. P. II (1873) 519; Grossg., Fl. Kavk. II, 249.

Undershrub, with a rather stout vertical root; stem branched at base; branches densely clothed with short appressed whitish hairs; leaves approximate in upper part of branches, 3-foliolate; petioles pubescent, as long as or shorter than leaflets; leaflets short-petioluled, appressed-puberulent on both surfaces, firm, rather thick, with a prominent midrib, the middle broadly obovate, narrowly cuneate at base, obtusish, 9–10 mm long and 7–9 mm broad, the lateral smaller, inequilateral; stipules paired, acute, very hairy, 1–1.5 mm long; flowers 1–3 opposite the approximate upper leaves, on hairy pedicels 2–3 mm long; bracts small, densely hairy; calyx 2-parted almost to base, the upper lip 5 mm long, with 2 narrowly lanceolate lobes, the lower 6–7 mm long, acutely 3-toothed; corolla pale yellow, with roseate standard and darker reddish nerves; standard suborbicular, clawed, 8 mm long including claw, 7 mm broad; wings 8 mm long, 2 mm broad, slightly beveled at tip; keel semicircular, clawed, 6 mm long; stamens 6–7 mm long; style curved, with capitate stigma; pod 16 mm long and 4 mm broad, 5- or 6-seeded, very slightly moniliform, covered with short hairs, May–July.

Dry slopes.— Caucasus: S. Transc. (Armenia). **Gen. distr.**: Arm.-Kurd. (?), Iran. (Korud). Described from Alindzhi-Chai in Armenia. Type in Leningrad.

54 Genus 782. **SPARTIUM** * L.**

L. Gen. ed. I (1737) 218.

Calyx membranous, inflated, split, 5-toothed; standard larger than other petals, orbicular; claws of petals adnate to staminal tube; pod linear, flat, many-seeded. Shrubs with stout sulcate green branches and remote simple leaves. Russian name: metel'nik.

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* From Greek spartios — shrub.

** Treatment by A. S. Lozina-Lozinskaya.

1. **S. junceum** L. Sp. pl. ed. 1 (1753) 708; Grossg., Fl. Kavk. II, 249. — Spartianthus junceus Link, Enum. Pl. Hort. Berol. II (1822) 223. — Ic.: Rchb. Ic. Fl. Germ. XXII, 2069, f. 1—19.

Shrub to 2 m high; branches erect, stout, green, sulcate, very sparsely leafy; leaves simple, short-petioled or sessile, lanceolate or oblong-oboval, stiff, with prominent midrib, 2—4 cm long, and 0.2—0.4 cm broad; flowers short-pediceled in a long loose terminal raceme; calyx membranous, inflated, split above almost to base, with 5 short acute teeth on lower side, 8—9 mm long; corolla yellow; standard suborbicular, 30 mm long including claw, 25 mm broad, slightly attenuate toward apex; wings oblong, 2 cm long, with a short claw and a rather sharp auricle; keel sharp-tipped, curved, darker than other petals, 25 mm long; petal claws adnate to staminal tube; style exceeding stamens; pod linear, flat, many-seeded, to 8 cm long and 0.7 cm broad, distinctly moniliform. May—July.

Dry hills. — European part: Crim. (naturalized); Caucasus: W., E., and S. Transc. **Gen. distr.**: W. and E. Med., Bal.-As. Min., Arm.-Kurd. Introduced in S. America. Described from S. France. Type in London.

Genus 783. **GENISTA** * L.**

L. Gen. pl. ed. 5 (1754) 318. — Corniola Adans. Fam. II (1763) 321. — Genistoides Moench, Moth. (1794) 132. — Asterocytisus Schur in Fuss, Fl. Transs. (1866) 154.

Shrubs [not perennial], bilabiate to the middle, the upper lip with 2 triangular teeth, the lower with 3 shorter lance-linear teeth, rarely all teeth subequal; petals yellow or whitish yellow; standard slightly exceeding wings and keel; all 10 stamens united into a tube, the anthers of 5 longer stamens short and dorsifixed, the other 5 longer, basifixed; ovary glabrous or pubescent; pods linear-oblong, compressed laterally, more or less curved, 2-valved, glabrous or hairy. Low, sometimes depressed shrubs, with simple leaves. Russian name: drok.

Note. The genus Genista contains about 80 species distributed chiefly through the Mediterranean region, most species being associated with mountain habitats; only few species occur in the plains. There are 19 species in the USSR, but their systematics has not yet been fully worked out because of incomplete material.

1. Standard and keel pubescent . . . . 2.
+ Standard and keel always glabrous . . . . 8.
2. Stipules divided, spiny; plants 30—70 cm high . . . . . 1. **G. germanica** L.
+ Stipules never spiny; plants 10—20 (40) cm high . . . . 3.
3. Branchlets and leaves densely patulous-hairy . . . . 4.
+ Branchlets and leaves appressed-hairy . . . . 5.
4. Leaves 4—8 mm long; raceme rather loose (Crimea) . . . . 2. **G. albida** Willd.

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* A plant name used by Virgil.

** Treatment by B. K. Shishkin.

+ Leaves 8–11 mm long; raceme compact, subcapitate . . . . 3. **G. compacta** Schischk.

5. Flowers nodding; standard emarginate . . . . 6. **G. armeniaca** Spach.

+ Flowers obliquely ascending or spreading; standard entire . . . . . . 6.

6. Pedicels 4–10 mm long; calyx 5.5 mm long; standard 14–15 mm long (Caucasus) . . . . 5. **G. angustifolia** Schischk.

+ Pedicels 1–5 mm long; calyx 4–4.5 mm long; standard 12–13 mm long . . . . 7.

7. Pods appressed-hairy; plants heavily canescent . . . . 4. **G. scythica** Pacz.

+ Pods patulous-hairy; sparsely hairy green plants . . . . 19. **G. pilosa** L.

8. Ovary and pod hairy . . . . 9.

+ Ovary and pod glabrous . . . . 12.

9. Leaves ovate-oblong or ovate, 4–11 mm broad . . . . . 10. **G. humifusa** L.

+ Leaves lance-ovate or linear, 1–4 mm broad . . . . 10.

10. Shoots flagellate (E. Transc.) . . . . 8. **G. flagellaris** Somm. et Lev.

+ Shoots not flagellate . . . . 11.

11. Leaves 1–3 mm broad, appressed-hairy (Crimea) . . . . 7. **G. depressa** M. B.

56 + Leaves 3–4 mm broad, patulous-hairy (W. Transc.) . . . . 9. **G. lipskii** Novop. et Schischk.

12. Shrubs 10–40 cm high . . . . 13.

+ Shrubs 50–170 cm high . . . . 18.

13. Calyx densely appressed-hairy . . . . 11. **G. tetragona** Bess.

+ Calyx sparsely hairy or glabrous . . . . 14.

14. Plants glabrous throughout (Novorossiisk) . . . . 12. **G. glaberrima** Novop.

+ Plants more or less hairy . . . . 15.

15. Shrubs 10–20 cm high; racemes few-flowered . . . . 16.

+ Shrubs 20–40 cm high; densely leafy; racemes many-flowered . . . . 17.

16. Leaves 1–1.5 cm long, mostly obtuse . . . . . . ***G. artvinensis** Schischk.

+ Leaves 2–2.5 cm long, acute . . . . 13. **G. mingrelica** Alb.

17. Standard 11–12 mm long; plants 20–30 cm high (E. Transc.) . . . . 16. **G. transcaucasica** Schischk.

+ Standard 12–14 mm long; plants to 40 cm high (mountains of Greater Caucasus) . . . . 18. **G. suanica** Schischk.

18. Leaves ovate-lanceolate, 4–20 mm broad . . . . 19.

+ Leaves lanceolate or linear-lanceolate, 1–4 mm broad . . . . 20.

19. Leaves linear-lanceolate, 1–4 mm broad; calyx 3–3.2 mm long (chalk outcrops in the European part of the USSR) . . . . 15. **G. tanaitica** P. Smirn.

+ Leaves lanceolate or ovate-lanceolate, 4–20 mm broad; calyx 4 mm long . . . . 19.

20. Leaves subulate-tipped, the subulate stipules 3–4 mm long (Transc.) . . . . 17. **G. patula** M. B.

+ Leaves minutely mucronulate or obtusish, the subulate stipules 1–2.5 mm long . . . . 14. **G. tinctoria** L.

Subgenus 1. **SPARTOCARPUS** Spach in Ann. sc. nat. 3 sér. II (1844) 240. — Brachycarpae Willk. in Willk. et Lange, Prodr. Fl. Hisp. III (1877) 420. — Pod short, ovoid or oblong, not tuberculate, containing 1 or 2, rarely 4 or 5 seeds.

Section 1. VOGLERA (Gaertn.) Rchb. Consp. (1828) 153. — Gaertn., Mey., Scherb. Fl. Wetter. II (1800) 480 sub subgen. — Acanthogonia Nyman, Consp. (1878) 151. — Small shrubs with spines in the leaf axils.

1. **G. germanica** L. Sp. pl. (1753) 710; Ldb. Fl. Ross. I, 516; Shmal'g., Fl. I, 214. — G. spinosa Gilib. Fl. Lithuan. IV (1785—1787) 78. — G. villosa Lam. Fl. Fr. II (1788) 615. — Scorpius spinosus Moench, Meth. (1794) 134. — Voglera spinosa Gaertn., Mey. et Scherb. Fl. Wett. II (1800) 500. — V. germanica Fourr. in Ann. Soc. Linn. Lyon N. S. XVII (1869) 195. — Cytisus germanicus Vis. Fl. Dalmat. III (1852) 268. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 35. — Exs.: HFR No. 1565.

Shrub; stem 20—60 cm long, erect or ascending, profusely branched; branches upright, soft-pubescent, with green branched or simple spines in the leaf axils; leaves subsessile, oblong-elliptic or ovate-lanceolate, 1—1.5 cm long and 5—7 mm broad, mucronate, the margin long-ciliate; flowers yellow in a raceme 1.5—5 cm long; pedicels short, hirsute; bracts minute, subulate, half length of pedicel; calyx 4 mm long, soft-pubescent, the upper lip deeply 2-parted, the lower 3-toothed; standard ovate, cordate at base, 7—8 mm long and 4 mm broad, glabrous, the claw 1.5 mm long; keel pubescent, exceeding standard, 9—10 mm long; wings 6.5 mm long; pod oblong, ca. 1 cm long and 4.5 mm broad, pubescent, with 2—5 ovate flattened seeds. June—July. (Plate IV, Figure 5).

Dry coniferous woods, wood margins, and scrub. — European part: Balt., U. Dnp., U. Dns., M. Dnp., U. V., V.-Kama (W. part). **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., Bal.-As. Min. (N. Balkans). Described from Germany. Type in London.

Subgenus 2. **STENOCARPUS** Spach in Ann. Sc. nat. 3 ser., III (1845) 106. — Stenocarpae Willk. in Willk. et Lange, Prodr. Fl. Hisp. III (1877) 421. — Pod linear or oblong to oblong-lanceolate, straight or slightly curved, point-tipped, compressed, tuberculate, usually many-seeded.

Section 1. SPARTIOIDES Spach in Ann. Sc. Nat. 3 ser., III (1845) 113. — Unarmed shrubs or shrublets; calyx persistent; keel and wings not recurved, at length approximate to standard.

Series 1. **Albidae** Schischk. — Low shrubs; standard and keel densely pubescent on the outside.

2. **G. albida** Willd. Sp. pl. III, 2 (1800) 942; Spach in Ann. Sc. Nat. 3 sér., III (1845) 117 ex parte; Ldb. Fl. Ross. I, 518; Shmal'g., Fl. I, 215. — G. godetii Spach l.c., (1845) 118. — G. pilosa Ldb., Fl. Ross. I, 518, non

L.—G. albida α genuina et β godetii Boiss., Fl. Or. II (1872) 42.— Telinaria albida Presl, Bot. Bemerk. (1844) 136.— Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 36.— Exs.: HFR No. 709.

58 A shrublet 10—30 cm high, much branched; branches short, ascending, densely covered with spreading or subappressed hairs; leaves covered with short spreading shining hairs, lance-oblong, 4—8 mm long and 1—2 mm broad, in the inflorescence obovate-spatulate and obtuse; flowers whitish-yellowish, in loose racemes 1—4 cm long at ends of branches; pedicels 2—3 mm long; bracts ovate or spatulate, shorter than calyx; calyx ca. 5 mm long, silvery-pubescent, the lobes about half length of calyx, lanceolate, acutish; standard ovate, 10—11 mm long, pubescent externally; wings slightly shorter than standard; keel about equaling standard, pubescent externally; pod oblong, 2—2.5 cm long and 4 mm broad, pubescent, slightly curved. End of April to June. (Plate IV, Figure 2).

Stony and clayey slopes; rocks and stony taluses.— European part: Crim. Endemic. Described from the Crimea. Type in Berlin.

3. **G. compacta** Schischk. in Addenda X, p. 289.

A shrublet, 8—25 cm high, much branched; branches short, ascending, densely covered with soft spreading hairs; leaves lanceolate or oblong, 8—11 mm long and 1—2 mm broad, covered on both sides with soft spreading hairs; flowers whitish-yellowish, short-pediceled, in a short and rather compact broad-ovoid raceme 2—3 cm long; calyx pubescent, 5 mm long, parted to the middle, the 2 upper lobes broad-ovate, the 3 lower narrowly lanceolate; standard broad-ovate, 12 mm long and 9 mm broad, retuse; standard and keel silvery-pubescent externally; wings ca. 3 mm shorter than standard; ovary densely hairy. July.

Rocks.— Caucasus: Cisc. Endemic. Described from Zhitna in the Caucasian State Reserve. Type in Leningard.

4. **G. scythica** Pacz. in Zap. Kievsk. Obshch. estestv. X, 2 (1889) 424; Pach., Mater. dlya fl. stepei Khersonsk. gub. (1890) 76.— G. albida var. scythica Schmalh., Fl. I (1895) 215.— Ic.: Pacz. l. c., (1889) tab. VII, f. 8, 9.— Exs.: HFR No. 1974. Herb. Fl. Rep. Sov. Ucr. No. 71.

A shrublet, 10—25 cm high; branches ascending or decumbent, minutely appressed-puberulent to subglabrous; leaves lanceolate or oblong, 6—13 mm long and 1—2 mm broad, acute, in inflorescence obovate-spatulate and obtuse, appressed-sericeous beneath, quite glabrous above, with more or less revolute margins; flowers yellow, loosely racemed at ends of branches; pedicels 2—3 mm long; bracts ovate or spatulate, shorter than calyx; calyx 4—4.5 mm long, silky-puberulent, the lobes about half length of calyx, acute, the lower short-lanceolate, the upper triangular; standard ovate, 12—13 mm 59 long, pubescent externally; wings slightly shorter than standard; keel equaling standard, pubescent externally; pod oblong, ca. 2 cm long, somewhat spreading, curved, hairy; seeds flattish, black, shining. May—June.

Calcareous slopes.— European part: Bl. Endemic. Described from the former Kherson and Ekaterinoslav provinces. Type in Kiev.

5. **G. angustifolia** Schischk. sp. nova in Addenda X, p. 289.

A shrublet, 15—40 cm high; branches ascending, initially slightly pubescent, soon glabrescent; leaves lanceolate or narrowly lanceolate, rarely narrowly ovate, acute or obtuse, narrowing toward base, sessile, 9—11 mm long and 1—2.5 mm broad, commonly revolute-margined, covered beneath with silky appressed white hairs, more sparsely hairy to subglabrous above; flowers yellow, loosely racemed at ends of branches; pedicels pubescent, 3—5 (10) mm long; calyx 5.5 mm long, puberulent, the lobes one-third to half length of calyx, the 2 lower ovate, the upper narrowly lanceolate; standard broad-ovate, 14—15 mm long and 8—9 mm broad, cuneately attenuate toward base, pubescent externally; pods (not fully ripe) densely pubescent, oblong, 20 mm long and 4 mm broad. June-July.

Limestone escarpments. — Caucasus: Cisc., Endemic. Described from the Maikop District (Daisu River — V. Maleev). Type in Leningrad.

6. **G. armeniaca** Spach. in Ann. Sc. Nat. sér. 3, III (1845) 118; Grossg., Fl. Kavk. II, 250. — G. albida γ armeniaca Boiss., Fl. Or. II (1872) 42.

A shrublet, 10—20 cm high; branches procumbent or ascending; young branchlets silvery-pubescent; leaves lanceolate or oblong, acute, 2.5—7 mm long and 1.5—3 mm broad, often folded longitudinally, silvery-pubescent or glabrous; floral leaves obovate to linear, obtuse; inflorescence racemose; flowers yellow; pedicels silvery-pubescent, 2.5—4.5 mm long; bracts small, setaceous; calyx 4.5 mm long, silvery-pubescent, the lobes half length of calyx, the 2 upper triangular, the 3 lower linear-lanceolate; standard broad-ovate, 9—11 mm long, retuse, pubescent externally; short-clawed; wings and keel slightly shorter than standard; keel pubescent externally; pod silvery-pubescent. June—July.

So far unknown from the USSR, but occurring in adjoining parts of Turkey (Oltu); possibly occurring in S. Transc. **Gen. distr.**: Arm.-Kurd. Described from Armenia. Type in Paris.

Section 2. **GENISTOIDES** Spach. l. c., 125. — Unarmed shrubs or shrublets; calyx caducous; keel and wings becoming recurved; standard folded after flowering, enveloping the pod.

Series 1. **Depressae** Schischk. — Low shrubs, with hairy pods.

7. **G. depressa** M. B. Fl. taur.-cauc. III (1819) 460, non Ten. (1836); Spach. in Ann. Sc. Nat. sér. 3, III (1845) 129; Boiss., Fl. or. II, 46. — G. tinctoria β decumbens Ldb. Fl. Ross. I (1842) 517. — G. tinctoria ζ depressa Schmalh., Fl. sredn. i yuzhn. Ross. I (1895) 215.

Shrublet; stems prostrate or ascending, 10—25 cm long, branched from base; young branchlets commonly with scattered hairs; leaves subsessile, lanceolate to lance-linear, 8—18 mm long and 1—3 mm broad, acute, appressed-hairy or glabrous; inflorescence a rather loose raceme 2—5 cm long; pedicels short, hairy; calyx pubescent, cleft to below the middle, the lobes acute, the 2 lower triangular-lanceolate and ca. 1 mm broad at base, the 3 upper linear-lanceolate and half as broad; standard broad-ovate, 11 mm long and 8 mm broad, rounded at apex, glabrous; wings and keel about equaling standard; pod oblong-linear, 6-seeded, ca. 1.8—2.5 cm long and 3 mm broad, appressed-hairy. June—August.

Exposed slopes and glades in oak, pine, and mixed woods; also grassy mountain pastures. — European part: Crim. Endemic. Described from S. Crimea. Type in Leningrad.

8. **G. flagellaris** Somm. et Lev. in A. H. P. XVI (1900) 109; Grossg., Fl. Kavk. II, 250.

Shrublet; stems numerous, 15–30 cm long, ca. 2 mm thick, ascending, sulcate; branches slender, flexuous, weak, simple; leaves narrowly lanceolate, 1.5 cm long and 1–1.5 mm broad, acuminate, 1-veined; stipules very small, subulate, glabrous, often lacking; flowers yellow, short-pediceled, in loose racemes; calyx appressed-pubescent, the lobes half length of calyx, the upper linear-lanceolate, the lower sublinear; standard broad-ovate, 10 mm long and 8 mm broad, rounded at apex, obscurely cordate at base, glabrous; wings and keel shorter than standard; pod appressed-hairy, linear-oblong, 1.8–2.2 cm long and 4 mm broad, containing 2–5 seeds. May–June.

63 Dry slopes. — Caucasus: E. Transc. Endemic. Described from the vicinity of Gori. Type in Florence.

9. **G. lipskii** Novop. et Schischk. in Transact. of the Biol. Sc. Research Inst. affil. to the state V. M. Molotov University of Rostov-on-Don I (1938) 5. — G. humifusa ssp. Lipskii Novop. et Schischk., l. c., in synon. — G. tinctoria γ humifusa Schmalh., Fl. sredn. i yuzhn. Ross. I (1895) 215 ex parte?

A shrublet, 10–17 cm high, much branched, clothed with soft spreading hairs; stem densely leafy, sulcate; lower leaves obovate-oblong, rather prominently veined, obtuse; median cauline leaves oblong to oblong-elliptic, subacute, 10–15 (25) mm long and 3–4 mm broad; upper leaves narrower, acute; racemes loosely 3–5-flowered; calyx ca. 7 mm long, subpatulous-hairy, with subulate lobes; standard broad-ovate, 14 mm long and 9 mm broad, obtuse, cuneately attenuate to petiole 3 mm long; wings and keel about equaling standard; ovary and pod densely hairy. April.

Stony marl slopes. — Caucasus: W. Transc. (Myskhako near Novorossiisk, Tonnel'naya station, Aderba River valley near Gelendzhik). Endemic. Described from the vicinity of Novorossiisk. Type in Leningrad.

10. **G. humifusa** L. Syst. Naturae ed. X (1759) 1157; Boiss., Fl. Or. I, 45; Grossg., Fl. Kavk. II, 250. — Telinaria humifusa Presl, Bot. Bemerk. (1844) 136. — Genista commixta Spach. in Ann. Sc. nat. 2 sér., III (1845) 132. — Ic.: Jaub. et Spach, Illustr. or., tab. 150 sub G. commixta.

A shrublet, 10–20 cm high, branched from base; primary branches prostrate; secondary branches obliquely ascending, patulous-hairy or rarely glabrous; leaves oblong-ovate to ovate, 1–2.5 cm long and 3–9 mm broad, prominently veined, sparingly pilose or glabrate; inflorescence a short or after anthesis more or less elongated raceme 2–8 cm long; flowers yellowish; pedicels pubescent, 1–2.5 mm long; calyx 7 mm long, soft-pubescent, lobed to about the middle, the 2 upper lobes triangular acuminate, the 3 lower linear; standard broad-ovate, 12–13 mm long and 8–9 mm broad, cuneately attenuate at base to petiole 3 mm long, glabrous; wings and keel scarcely shorter than standard; ovary pubescent; pod lanate, oblong, 2–2.5 cm long and 0.4 mm broad. May–July.

Mountain slopes, sometimes wooded. — Caucasus: W. Transc. **Gen. distr.**: As. Min. (Pontus — Tournefort). Described from plants collected by Tournefort in the Orient. Type in London.

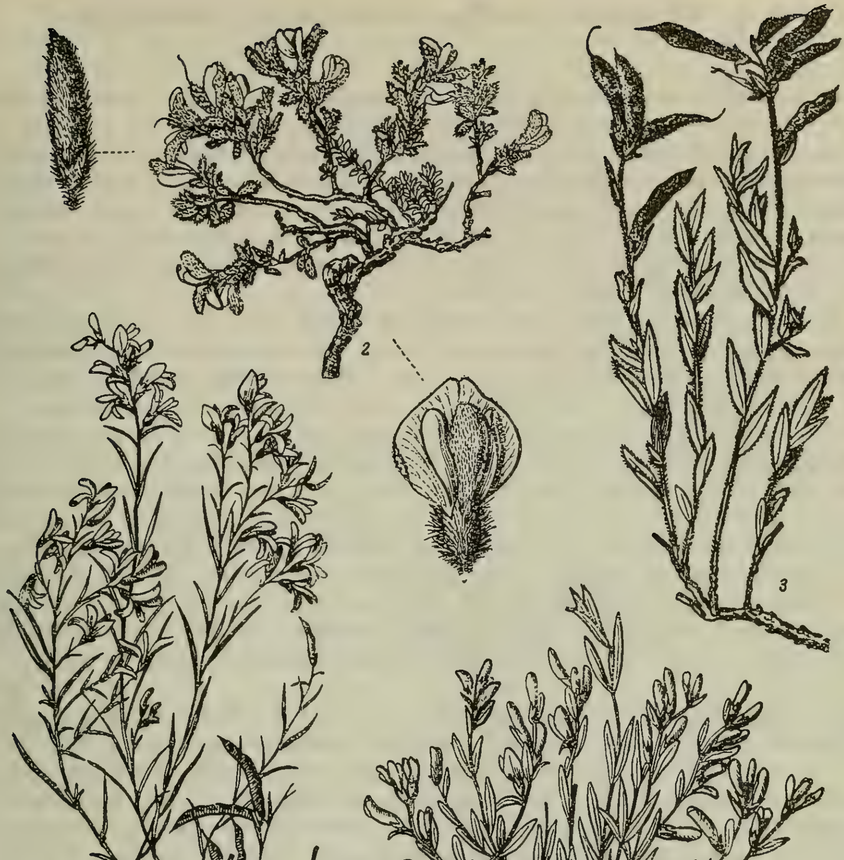

PLATE IV. Genista tanaitica P.Smirn., aspect, flower, pod; 2 – G.albida Willd., aspect, pod; 3 – G.humifusa L.; 4 – G.tetragona Bess., aspect, flower; 5 – G.germanica L., portion of branchlet, raceme in bloom.

Series 2. **Tetragonae** Schischk. – Shrublets 5–20 cm high, with glabrous fruits.

64 11. **G. tetragona** Bess. Enum. plant. hucusque in Volhyn., Podol. (1821–1822) 73; Spach. in Ann. Sc. Nat. sér. 3, III (1845) 130. – G. tinctoria β decumbens Ldb. Fl. Ross. I (1841) 517 ex parte; Rogovich, Obozrenie semennykh i vysshikh sporovykh rastenii, vkhodyashchikh v sostav flory gubernii Kievskogo uchebnogo okruga [Survey of Seed and Higher Spore Plants Included in the Flora of the Kiev Educational District], p. 66. – G. tinctoria β depressa Schmalh., Fl. sredn. i yuzhn. Ross. I (1895) 265. – Ic.: Rchb. Fl. crit. IV, tab. 39.

Shrublet, 8–15 cm high, branched from base; branches obliquely ascendin young branchlets densely appressed-hairy; leaves oblong-lanceolate, the lower oblong-spatulate, 1–2 cm long and 2–4 mm broad, acute to obtuse, appressed-pubescent; inflorescence a loose raceme; flowers yellow; pedicels appressed-pubescent, 2–3 mm long, with minute cuneate-subulate bracteoles at summit; calyx ca. 5 mm long, densely appressed-hairy, the lobes half length of calyx, the 2 upper triangular and 1 mm broad at base, the 3 lower linear-lanceolate and 0.5 mm broad at base; standard broad-ovate, 10 mm long and 7 mm broad, obscurely cordate at base, glabrous; wings and keel shorter than standard; ovary glabrous; May–June. (Plate IV, Figure 4).

Chalky slopes. – European part: Bl. (the small Yorlik River near the town of Yorlik, Maloestsy in the former Tiraspol' County, between Yorlik and Rastsvok). Endemic. Described from Rastsvok. Type in Kiev.

12. **G. glaberrima** Novopokr. in Transact. of the Biol. Sc. Research Inst. affil. to the state V. M. Molotov University of Rostov-on-Don I (1938) 7.

A shrublet, 10–15 cm high, profusely branched at base, quite glabrous throughout; stems procumbent, woody, soon dying off at tips; branches ascending, terminating in inflorescences; lower leaves oblong, obtusish; upper leaves linear-oblong, rather prominently veined; racemes 5–10-flowered; calyx ca. 7 mm long, glabrous, parted to below the middle; standar 14 mm long and 8–9 mm broad; ovary and pod glabrous. June.

Marl outcrops. – Caucasus: W. Transc. (Myskhako near Novorossiisk). Endemic. Described from Myskhako. Type in Rostov; cotype in Leningrad

13. **G. mingrelica** Alb. Prodr. Fl. Colch. (1895) 52; Grossg., Fl. Kavk. II, 251.

A shrublet, 12–15 cm high, branched from base; branches obliquely ascending, sparingly pubescent or glabrous, leaves lanceolate, acute, 1.5–2.5 cm long and 1.5–1.4 [?] mm broad, sparsely hairy or glabrous alon the margin, the lowermost shorter, linear or lance-oblong; inflorescence a loose raceme 1–3 cm long, 3- or 4-flowered; flowers buff; pedicels
65 glabrous, 2–3 mm long; calyx 6–7 mm long, 5-parted to below the middle, appressed-hairy or glabrous, the 2 upper lobes triangular acuminate, the lower 3 linear; ovary glabrous; pod linear-oblong, 2–2.5 cm long and 3.5 mm broad, glabrous. June.

Alpine slopes. – Caucasus: W. Transc. (Mingrelia). Endemic. Described from Mt. Kargishal. Type in Geneva; cotype in Leningrad.

***G. artwinensis** Schischk. sp. nova in Addenda X, p. 290. – G. lydia Grossh., Fl. Kavk. II, 521, non Boiss. – Exs.: Woron. et Schelk. (sub G. lydia).

Shrublet; root 5–7 mm thick; stems numerous, ascending, woody in lower part, short-branched, sparsely covered with short stiff obliquely ascending hairs; leaves narrowly lanceolate, 0.8–2.5 cm long and 1–3.5 mm broad, acute, covered with obliquely ascending hairs, the margins ciliate; inflorescence a raceme 5–10 cm long, loosely flowered in lower part, more densely above; pedicels glabrate, 1–2 mm long; calyx ca. 5 mm long, parted to two-thirds into 3 narrow and 2 broader lobes; corolla yellow; standard broad-ovate, 12 mm long and 8 mm broad, rounded at apex, short-clawed; wings and keel slightly shorter than standard; ovary glabrous; pod glabrous, linear-oblong, 3 cm long and 4 mm broad. May–June.

Stony slopes and taluses, often in scrub. – Caucasus: S. Transc. (Artvin). Endemic. Described from near the village of Lomashen. Type in Leningrad.

Series 3. **Tinctoriae** Schischk. – Taller shrubs, 20–150 cm in height, with glabrous fruits.

14. **G. tinctoria** L. Sp. pl. (1753) 710; Ldb. Fl. Ross. I, 516, ex parte; Shmal'g., Fl. I, 215 excl. var.; Kryl., Fl. Zap. Sib. VI, 1584. – ? G. sibirica L. Mant. II (1759) 571. – G. inermis Gilib. Fl. Lithuan. II (1785) 77. – G. hungarica Kern. in Oesterr. Bot. Zeitschr. (1863) 140. – G. elata Wender. in Linnaea XV (1841), Litt. 100. – G. ovata Ldb. Fl. Ross. I, 518, non Waldst. et Kit. – G. campestris Janka in Linnaea XXX (1859–1860) 562. – ? G. calcicola Schur in Verh. Naturf. Ver. Bremen XV, II (1877) 166. – G. incubacea Schur, Enum. Transsilv. (1866) 145. – G. stenophylla Schur in Verh. Naturf. Ver. Bremen XV, II (1877) 166. – G. rupestris Schur, Enum. Transsilv. (1866) 145. – G. marginata Bess. in Andrzh., Ischislenie rastenii Podol'skoi gubernii i smezhnykh s neyu mest [Plants of the Podolian Province and Adjacent Regions] (1869) 29. – G. tinctoria α vulgaris, β fastigiata, γ ascendens, ζ marginata Rogov, Obozrenie semennykh i vysshikh sporovykh rastenii, vkhodyashchikh v sostav flory gubernii Kievskogo uchebnogo okruga [Survey of Seed and Higher Spore Plants Included in the Flora of the Kiev Educational District] (1869) 76. – G. tinctoria var. rossica Majevsky, Fl. sredn. Ross. ed. V (1930) 212. – Corniola tinctoria Medik. in Vorles. Churpf. Phys. Ges. II (1787) 342. – C. sibirica Medik. l. c., (1787). – Genistoides tinctoria Moench, Meth. (1794) 133. – Spartium tinctorium Roth, Tent. Fl. Germ. I (1800) 302. – Cytisus tinctorius Vis. Fl. Dalm. III (1860) 258. – Ic.: Rchb. Ic., Fl. Germ. XXII, tab. 37. – Exs.: Pl. Polon. exs. No. 145; Pl. exs. Reipubl. Bohem.-slovenicae No. 231.

Shrub; stems 50–150 cm high and to 1.5 cm thick; branches upright, glabrous; leaves linear to lanceolate, 1.5–4 cm long and 3–10 mm broad, acute, cuneately attenuate toward base, sparsely covered on the margin and on midrib beneath with appressed hairs, smaller and narrower on flowering branches; stipules subulate, 1–3 mm long; flowers yellow, in dense racemes 3–5 cm long at ends of branches; pedicels 2–3 mm long; bracts exceeding calyx; calyx 5 mm long, the triangular teeth about half length of calyx; standard ovate, 9–12 mm long (in var. grandiflora Litw. 15–17 mm) and 7–8 mm broad, short-clawed; wings slightly shorter than standard; keel glabrous; pod linear, 2–2.5 cm long and 3–4 mm broad, glabrous, slightly curved; seeds blackish brown, elliptic, 2.5 mm long and 2 mm broad, somewhat shining. June–July.

Dry woods, wood margins, pine woods and scrub, hillsides, chiefly on calcareous or sandy soil. – European part: Lad.-Ilm., Balt., U.V., V.-Kama, U.Dnp. U.Dns., V.-Don, Bl.; W. Siberia: Ob (S. part), U.Tob. (Urals). **Gen. distr.**: Scand., Centr. Eur., Atl. Eur. Described from Germany and England. Type in London.

Note. Over the vast distribution area, in both W. and E. Europe, G. tinctoria L. displays great variability. The synonymy listed above indicates that there have been numerous attempts to separate certain forms as distinct races. However, the study of plentiful material from the USSR as well as from W. Europe exposes the inconsistency of morphological characters that have been proposed as a basis for splitting G. tinctoria into minor species. The only definite case at present for separation into a distinct species applies to dyers greenwood growing on chalk outcrops and we present it indeed as an independent species, G. tanaitica P. Smirn. As regards the plant from Savran, designated by Besser as a separate species G. marginata and supposed by description to have hairy pods, it was found upon examination of the authentic specimen in Besser's herbarium in the Botanical Institute of the Ukrainian Academy of Sciences, that it had to be referred to G. tinctoria, since the fruits of the authentic specimens proved to be glabrous while the hairiness of the leaf margin indicated by Besser does not in any way differ from this character as displayed by typical G. tinctoria L. The Ukrainian investigator Kotov has recently described two species: G. donetzica Kotov, growing on chalk outcrops and clayey marl slopes by the Donets River, distinguishable by thicker leaves up to 2 cm broad and larger fruits; the other, G. borysthenica Kotov, on sands in the lower reaches of the Dnieper, with leaves
67 not more than 1–4 mm broad. Both species need more study.

15. **G. tanaitica** P. Smirn. in Bull. Soc. Nat. Mosc. XLIX, 2 (1940) 86. – G. cretacea Schischk. in sched.

A shrub to 20–50 cm high, branched from base; branches obliquely ascending, those of the first order branched in turn, the young branchlets slightly pubescent or subglabrous; leaves linear-lanceolate or oblong-linear, 1–3 (6) cm long and 0.5–3 (5) mm broad, glaucescent, glabrous or scarcely pubescent; flowers in loose racemes at ends of stems and branches; calyx glabrous, ca. 3 mm long, cut to one-third or nearly to the middle into triangular-lanceolate lobes, of these the lower 3 very slightly shorter and narrower; standard ovate, 10–11 mm long and 6 mm broad, obtuse, attenuate at base to a short claw, glabrous; wings and keel scarcely shorter than standard; ovary glabrous; pod linear, 3 cm long and 3 mm broad, glabrous, almost straight. June–July. (Plate IV, Figure 1).

Chalky hills. – European part: Bl., L. Don. Endemic. Described from the sources of the Goluboi River in Stalingrad [Volgograd] Region. Type in Moscow.

16. **G. transcaucasica** Schischk. ex Grossh. et Schischk. in sched. ad Herb. Pl. or. exsicc. I (1924) 35; Grossg., Fl. Kavk. II, 251. – Exs.: Pl. or. exs. No. 138.

A shrub; stems numerous, 20—30 cm long, very slightly pubescent, arising from a woody rootstock; leaves lance-linear, 2—2.2 cm long and 2—3 mm broad, acute, appressed-hairy or subglabrous; stipules small, deciduous; flowers short-pediceled, in a terminal raceme; calyx appressed-pubescent, the acute teeth half length of the tube or somewhat longer; corolla yellow, glabrous; standard 11—12 mm long, about equaling wings, recurved after anthesis; pod glabrous. May.

Dry clayey slopes in the lower and middle forest zones. Caucasus: E. and S. Transc. Endemic. Described from the small Gidani River near the village of Mamkodi. Type in Tbilisi.

Economic importance. An important source of vegetable dyes in the Karabakh region. The plants are collected at flowering time and dried in the shade. I. P. Grunska-Vetrova (Tr. Bot. inst. Azerb. filiala Akad. Nauk VI, p. 169—170, 1939) reports the following experimental results. Wool and silk fabrics were dyed yellow by a soda extract of the plant with an aluminum mordant, and rusty-brown with chrome. A water extract produced much weaker colors. With an iron mordant an indeterminate olivaceous-gray color was obtained, and wool acquired a brownish-black color with a soda extract.

17. **G. patula** M. B. Fl. taur. -cauc. II (1808) 148; Boiss., Fl. or. II, 44 ex parte; Grossg., Fl. Kavk. II, 251. — G. tinctoria α erecta a. angustifolia Ldb. Fl. Ross. I (1842) 516. — G. dracunculoides Spach in Ann. Sc. Nat. 3 sér., II (1845) 139 ex parte.

A shrub, 50—100 cm high, much branched; annotinous branches ribbed, sparingly pubescent or subglabrous, pyramidally branched at summit; leaves lanceolate to ovate-lanceolate, 4—5 cm long and 0.4—1.8 cm broad, glabrous, ciliate on the margin, cuspidate; stipules acicular, 3—4 mm long; flowers yellow, short-pediceled, in racemes 2—5 cm long at ends of branches; calyx 4.5—6 mm long, cut to the middle, glabrous, the lobes of the upper lip triangular-lanceolate acuminate, those of the lower lip lance-linear and only half as broad at base; standard ovate, 9—12 mm long, almost round at base, glabrous, with claw 1.5 mm long; wings and keel slightly shorter than standard. June—July.

Deciduous woods and river valleys. — Caucasus: W. and E. Transc. (W. part). **Gen. distr.:** ? As. Min. ? Arm.-Kurd. Described from the vicinity of Tbilisi. Type in Leningrad.

18. **G. suanica** Schischk. in Grossh. Fl. Cauc. II (1930) 252 et in Addenda X, p. 290.

A shrub, woody at base; stems numerous, ascending, simple or branched above, angled, scarcely hairy, 20—40 cm long; leaves lance-linear, 1—2.5 cm long and 1—3 mm broad, acute, narrowing toward base, sessile, slightly hairy or subglabrous, soft-ciliate on the margin and on midrib; inflorescence a loose raceme 7 cm long; flowers yellow; pedicels slightly pubescent, ca. 3 mm long; calyx slightly pubescent, 6—7 mm long, cut to the middle into acuminate lobes, of these the lower 2 triangular, 1.5—2 mm broad at base, the upper 3 slightly longer, linear, ca. 0.75 mm broad; standard broad-ovate, 12—14 mm long and 8—9 mm broad, obscurely cordate at base, rounded at apex, the claw 2 mm long; keel and wings slightly shorter than standard, their claws 4 mm long; ovary glabrous; pod (immature) linear-oblong, glabrous. July—August.

Stony slopes and taluses in the alpine zone and in mountain woods, at altitudes between 1,000 and 3,000 m. – Caucasus: Gr. Cauc., W. Transc. Endemic. Described from the Istugra Glacier (Umba). Type in Tbilisi; cotype in Leningrad.

Section 3. **CHAMAESPARTUM** Spach in Ann. Sc. nat. 3, sér. III (1845) 140. – Chamaespartium Adans. Fam. II (1763) 321. – Low unarmed shrubs; leaves on young branches mostly in 2 ranks; calyx persistent in fruit; corolla caducous.

19. **G. pilosa** L. Syst. ed. X (1759) 1157; Sp. pl. ed. II (1763) 999; Ldb. Fl. Ross. I, 518; Shmal'g., Fl. I, 215. – G. repens Lam. Fl. Fr. II (1788) 618. – G. decumbens Willd. Sp. pl. II (1800) 841. – G. humifusa 69 Thore, Chlor. Land. (1803), 298, non L. – Genistoides tuberculata Moench Meth. (1794) 133. – Telinaria pilosa Presl, Bot. Bemerk. (1844) 136. – Cytisus pilosus Viscot in Rad. Jougosl. Acad. Zagreb. XXXI (1875) 97. – Spartium pilosum Roth, Tent. Fl. Germ. I (1788) 303. – Ic.: Rchb. Ic., Fl. Germ. XXII, tab. 42. – Exs.: Fl. exs. Reipubl. Bohem. Slov. No. 36, 813; Degen, Pl. Banatus exs. No. 895; Fl. exs. austro-hung. No. 3609; Hayek, Fl. stir. exs. No. 358.

A shrub, 5–30 cm high, with prostrate branches to 50 cm long and erect silky-puberulent branches; leaves short-petioled, oblong-obovate, 5–12 mm long and 1.5–3.5 mm broad, at length glabrous above, with short branchlets, in the axils; flowers 1–3 at ends of the axillary branchlets, forming an elongated racemiform panicle; pedicels silky-pubescent, as long as calyx; calyx sericeous, ca. 5 mm long, the lower lip 3-parted, shorter than the 2-parted upper lip; corolla golden-yellow, caducous; standard 8–12 mm long, pubescent outside like the wings; keel after anthesis forming a right or obtuse angle with standard; pods oblong, 3–8-seeded, 1–3 cm long and 2.5–4 mm broad, silvery-pubescent.

Dry slopes. – European part: Balt. (?), U. Dns. (?). **Gen. distr.**: Scand., Centr. and Atl. Eur., Bal.-As. Min. (Bal.). Described from Pannonia and Germany. Type in London.

Genus*LABURNUM * MEDIK. **

Medik. Philos. bot. I (1779) 204 (nomen) atque in Vorl. Churpf. phys. Ges. II (1787) 362 (descr.).

Flowers in leafless pendulous racemes; calyx irregularly campanulate, ca. 5 mm long, obscurely bilabiate, the upper lip 2-toothed, the lower 3-toothed; flowers 2–3 cm long; standard slightly longer than keel and wings; keel glabrous; style with capitate stigma; pods long-stipitate, the sutures thickened or winged. Russian name: bobovnik.

1. **L. anagyroides** Medik. in Vorl. Churpf. Phys. Ges. II (1787) 363. – Cytisus laburnum L. Sp. pl. (1753) 739; Ldb. Fl. Ross. I, 521; Shmal'g., Fl. I (1895) 217. Vernacular name: Zolotoi dozhd' [golden rain].

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* Latin name of the plant.

** Treatment by V.I.Krechetovich.

A small tree or shrub, 70–130 cm high; branches erect and pendulous, covered with light brown furrow-wrinkled bark; young branches and flowering shoots silvery with rather long appressed hairs; petioles appressed-pubescent, to 7–8 cm long; leaflets oblong-elliptic, elliptic, or ovate-elliptic, 3–8 cm long and 1.5–3 cm broad, glabrous above, sparingly puberulent beneath, silvery-hairy on the midrib; flowers golden-yellow, on silvery-pubescent pedicels, in many-flowered pendulous racemes; calyx irregularly campanulate, ca. 5 mm long, covered with short appressed silky hairs, obscurely bilabiate, the upper lip longer, with 2 short distant ciliate triangular teeth, the lower with 3 obsolescent ciliate teeth; standard broadly obovate, retuse, upcurved, to 2–2.5 cm long, glabrous above; wings slightly shorter; keel acute, glabrous; pods 5–8 cm long, linear, obscurely constricted between seeds, cuneately attenuate toward base, abruptly pointed at summit, with scattered short appressed hairs. April–June. (Plate V, Figure 4).

Cultivated in gardens and parks, sometimes naturalized. Grown in Belorussia, the Ukraine, Crimea, Caucasus, and Central Asia. **Gen. distr.:** W. and S. Eur. Described from Switzerland.

Genus 784. **TELINE** * MEDIK. **

Medik. Philos. Bot. I (1789) 203 (nomen) atque apud Webb. et Berth. Phytogr. canar. II (1836–1850) 34 (descr.).

Flowers in subcorymbose terminal inflorescences, the lower ones axillary; calyx infundibular-campanulate, to 5 mm long, 2-lipped to the middle or lower down, the upper lip with 2 elongated teeth, the lower minutely 3-toothed; corolla 10–15 mm long; standard oblong, not retuse, equaling corolla parts; keel rounded at apex, pubescent throughout; pod attenuate toward base; stamens 10, monadelphous. Russian name: lozhnodrok [false broom].

1. **T. monspessulana** (L.) Koch, Dendrol. I (1860) 30. – Cytisus monspessulanus L. Sp. pl. (1753) 740; Lipsky in A. H. P. XIV (1898) 254 and in Tr. Tifl. bot. sada IV (1899) 271; Grossh., Fl. Kavk. II (1930) 252.

Shrub 50–200 cm high, much branched; branches erect, prominently angled, diffusely patulous-hairy above; petioles hairy, 5–6 mm long; leaflets obovate, 8–15 mm long and 4–8 mm broad, ovate-cuneate at base, rounded at apex, pungent-tipped, glabrous above, sparingly pubescent beneath and rather densely hairy on margin and midrib; flowers yellowish, 3–9 together at ends of branches, on pedicels to 5 mm long; calyx infundibular-campanulate, to 5 mm long, bilabiate to the middle or below, rather densely covered with short spreading hairs, the upper lip deeply cut into 2 cuneate-triangular teeth, equaling the obscurely and minutely 3-toothed lower lip; standard 10–14 mm long, ovate, entire, glabrous above; wings and keel equaling standard, keel rounded-obtuse, with scattered hairs; pods slightly curved, 1.5–2.5 cm long, pubescent, attenuate toward tips. April–May. (Plate V, Figure 3).

Rocks and stony places. – Caucasus: W. Transc. (Sochi, Khosta). **Gen. distr.:** Med., Azores and Canary Islands. Described from Montpellier (France). Type in London.

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* From teline, Greek name of Genista, on account of resemblance to that genus.

** Treatment by V. I. Krechetovich.

Genus 785. **LEMBOTROPIS** * GRISEB. **

Griseb. Spicil. fl. Rum. I (1843) 10.

Flowers in leafless racemes; calyx irregularly campanulate, 3—5 mm long, bilabiate, the upper lip 2-toothed, the lower 3-toothed; flowers ca. 1 cm long; standard short-clawed, rounded at apex, equaling other corolla parts; keel carinate-pointed, glabrous; pods obsoletely stipitate, the sutures not thickened; stamens 10, monadelphous.

1. **L. nigricans** (L.) Griseb. Spicil. fl. Rum. I (1843) 10. — Cytisus nigricans L. Sp. pl. (1753) 739; Ldb. Fl. Ross. I, 521; Shmal'g., Fl. I, 218. — C. unibracteatus Lindem. in Bull. Soc. Natur. Moscou, XXII, 4 (1850) 471.

Shrub, 30—100 cm high, blackening in drying; branches erect, the younger parts sparsely puberulent, the older glabrous; petioles glabrate, 1—1.5 cm long; leaflets elliptic to obovate-elliptic, 1.2—2.5 cm long and 0.6—1 cm broad, ovate at base, rounded, obtuse or pungent at apex, glabrous above, sparingly appressed-pilulose beneath; flowers golden-yellow, in 15—30-flowered spiciform racemes at ends of shoots; pedicels appressed-hairy, to 5—7 mm long; calyx irregularly campanulate, ca. 3 mm long, with short appressed silvery hairs, the upper lip sharply 1-toothed, much longer than the lower; standard 0.9—1 cm long, glabrous, obscurely clawed, obovate, rounded at apex, equaling the wings and keel; wings entire; keel beaked, unguiform, glabrous; pods linear-lanceolate, 2—2.5 cm long and 5 mm broad, rather densely covered with short appressed hairs; seeds black. June—August. (Plate V, Figure 1).

Woods, scrub, and clearings. — European part: U. Dnp. (SW part), M. Dnp. (W. part), U. Dns., Bes. (N.), U. V., (Gorokhovets, Vyazniki, Balakhana, and Gorodets districts), V.-Don (vicinity of Penza). — **Gen. distr.**: Centr. and SE Europe (including the entire Balkan Peninsula), extending westward only
72 as far as Switzerland, and N. and S. Italy). Described from Europe.

Genus ★**ULEX** † L. ††

L. Sp. pl. I (1753) 241.

Flowers solitary or paired in the axils of setaceous leaves or spines at the ends of rudimentary branchlets; calyx deeply bilabiate; corolla golden-yellow, the keel pubescent; stamens 10, monadelphous; style slightly curved; pods hairy, 2—4-seeded. Russian names: ulex, kolyuchii drok [prickly broom].

The genus contains up to 20 species distributed through the Atlantic parts of W. Europe.

1. **U. europaeus** L. Sp. pl. (1753) 241; Medv., Derev'ya i kustarn. Kavk., Ed. 3 (1919) 67; Grossg., Fl. Kavk. II, 252. — U. grandiflorus Purret in Mem. Acad. Toul. III (1788) 333. — U. compositus Moench Meth. (1794) 289. — U. floridus Salisb. Prodr. (1796) 329. — U. vernalis Thore, Ess.

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* From Greek lembos — boat or its prow, and tropis — keel, implying a sharp keel.

** Treatment by V. I. Krechetovich.

† A name of a hydrophilous plant mentioned by Pliny, possibly from Latin uligo, moisture.

†† Compiled by B. K. Shishkin.

Chlor. Land. (1803) 299. — U. major Thore, I. c., (1803). — U. strictus Mackay in Trans. Roy. Irish Acad. XIV (1824) 166. — U. hibernicus G. Don, Gen. Syst. II (1832) 148. U. opistholepis Webb in Ann. Sc. Nat. sér. III, XVII (1852) 291. — U. armoricanus Mabille in Act. Linn. Soc. Bord. XXV (1864) 524. — Ic.: Rchb. Ic., Fl. Germ. XXII, tab. 2068. Vernacular name: angliiskii drok [English broom].

Shrub, spiny, much branched, densely villous, 1—2 (5) m high; branches deeply furrowed, with spines formed by leaf petioles and reduced branchlets of second or third order; leaves of seedlings at first 3-foliolate, later simple; leaves of mature plants reduced to spinescent petiole, spinescent stipules, and scalelike leaf base; flowers 1—3 on rudimentary lateral branchlets arising from axils of scalelike leaves and spines; pedicels 3—9 mm long, densely hairy; bracteole just below calyx, broadly triangular, brown, ca. 2 mm long; calyx deeply bilobate, persistent in fruit, densely clothed with soft brown hairs, 13—14 mm long; corolla golden-yellow; standard and wings glabrous; keel pubescent on the back; stamens monadelphous; pod narrowly ovoid, hairy, 1.5—2 cm long, very slightly exceeding calyx, 2—4-seeded; seeds carunculate. May—June.

Naturalized in proximity of gardens and plantations. — Caucasus: W. Transc. (Batumi). **Gen. distr.**: W. Med. and Atl. Eur. (naturalized plants are known from many locations in Europe and in the Balkans). Described from S. Europe. Type in London.

Economic importance. In western Europe Ulex europaeus is cultivated in sandy places as a forage plant. The young shoots, beset with numerous spines, are crushed between rollers and are then in a suitable condition for feeding to livestock.

Note. This plant was known by pre-Linnaean authors under the name Planta genista, hence Plantagenets, an English royal family. Ulex europaeus grows in Europe only in areas dominated by the Atlantic Ocean; it dies out eastward.

Genus 786. **CYTISUS** * L. **

L. Sp. pl. (1753) 739; Gen. pl. ed. 5 (1754) 328. — Wiborgia Mch. Meth. bot. (1794) 132.

Plant with normally developed leaves; flowers in leaf axils on the upper part of normal leafy branches; calyx tubular, (8) 10—15 mm long, much longer than broad, distinctly bilabiate; flowers (1.8) 2—3 cm long; standard greatly exceeding the wings and keel, retuse; keel pubescent on midrib, obtuse; stigma oblique, on outer face of style; pods obsoletely stipitate, the sutures not thickened; stamens 10, monadelphous. (Plate VI, Figure 5a—d). Russian name: rakitnik.

Economic importance. All broom species are of importance as honey plants.

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* From Greek kytisos, derived according to Pliny from the Island of Kythinos and designating a leguminous plant.

** Treatment by V. I. Krechetovich.

(73)

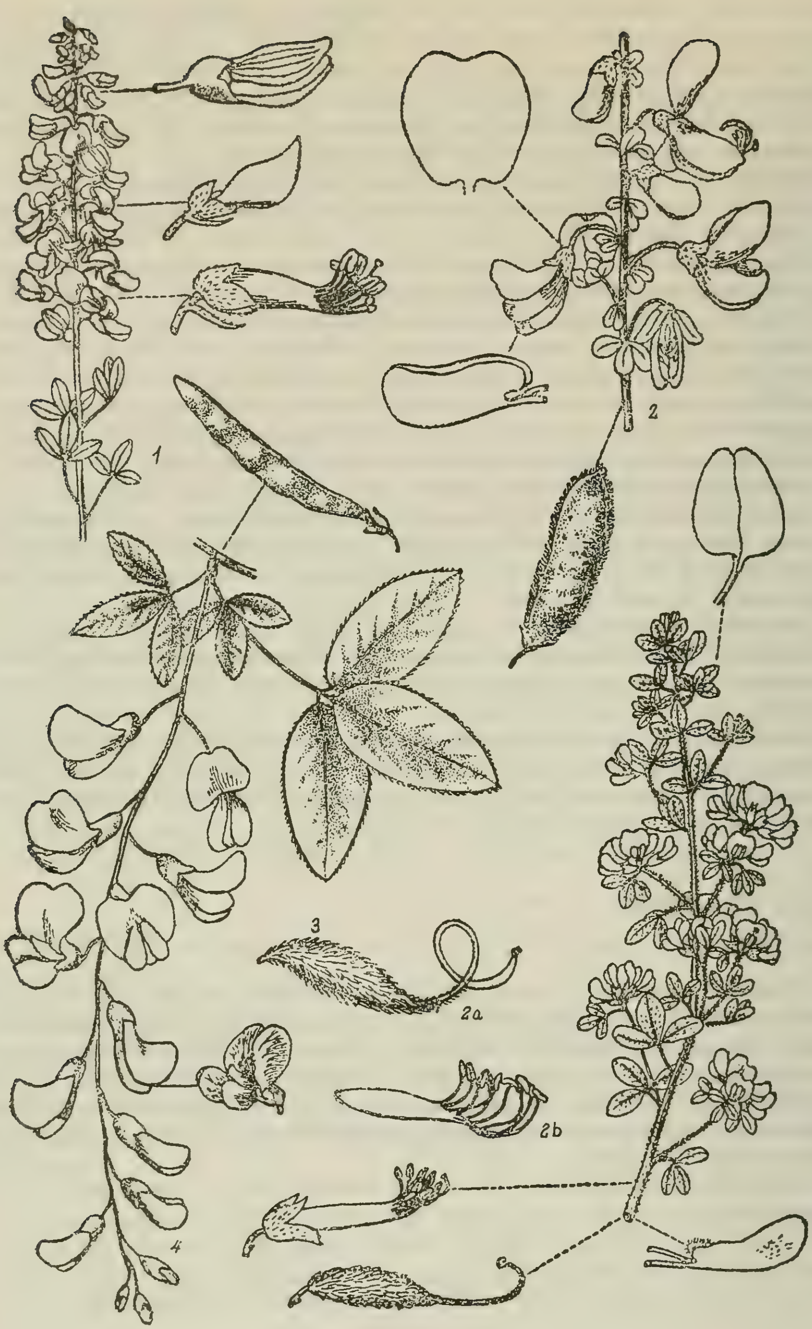

PLATE V. Lembotropis nigricans (L.) Griseb., raceme and flower parts; 2 – Sarothamnus scoparius (L.) Wimm. et Koch, raceme, flower parts, pod; 2a) ovary; 2b) stamina tube, 3 – Teline monspessulana (L.) Koch, raceme, flower parts; 4 – Laburnum anagyroides Medik., raceme, pod.

1. Branches distinctly angled; inflorescence spuriously terminal, containing 2–4 white or pale rose flowers . . . . 17. **C. skrobiszewskii** Pacz.
+ Branches terete or obscurely sulcate; inflorescence many-flowered, terminal or racemose; flowers yellow, rarely white . . . . 2.
2. Inflorescences terminal, corymbiform-capitate . . . . 3.
+ Inflorescences racemiform, spiciform or 1-sidedly crested . . . . . . 7.
3. Inflorescences at ends of young branches . . . . 4.
+ Inflorescences developing at different times at ends of old branches and on young shoots, thus young flowering shoots umbellately and racemosely surrounding the faded or fruiting inflorescence on an old branch . . . . 6.
4. Indument dense, gray, of short appressed hairs; leaflets lanceolate or narrowly lanceolate, heavily appressed-hairy, mostly acute; calyx conic-tubular, 8–10 mm long, densely appressed-hairy; standard 17–20 mm long . . . . 10. **C. austriacus** L.
+ Indument of scattered appressed hairs; leaflets oblong or obovate, glabrate, rounded at apex; calyx ovoid-tubular, 10–12 mm long, with scattered subappressed hairs, often subglabrous . . . . 5.
5. Standard 17–19 (20) mm long; flowers golden-yellow (chalks of S. part of the RSFSR* . . . . 12. **C. litwinowii** V. Krecz.
+ Standard (18) 20–25 mm long; flowers pale sulfureous or whitish yellow (W. Ukraine) . . . . 11. **C. blockii** V. Krecz.
6. Plants densely covered with short, exclusively appressed or subpatulous hairs; flowers white, rarely pale yellow . . . . 13. **C. albus** Hacq.
+ Plants shaggy with long spreading or subappressed hairs; flowers yellow . . . . 16.
7. Standard pubescent above; flowers in the leaf axils 1 or 2 . . . . . . 8.
+ Standard glabrous above; flowers in the leaf axils 1–2–3–5. . . . . . 11.
8. Large plants, 70–120 cm high, with erect branches, densely covered with short or long silvery hairs . . . . 9.
+ Mountain plants with decumbent branches, sparsely covered with whitish hairs . . . . 10.
9. Arenarious plants; young branches and leaves silky-pubescent with short appressed hairs; leaflets narrowly lanceolate, 2.5–3.5 cm long, finally 4–6 cm long; flowers few, remote; calyx and pod covered with silvery appressed hairs . . . . 1. **C. borysthenicus** Grun.
+ Steppe plants; shoots and leaves densely covered with long subappressed hairs; leaflets ovate to oblong-ovate, 1.5–2.5 cm long; flowers numerous; calyx and pod villous . . . . 2. **C. lindemanni** V. Krecz.
10. Various parts of the plant, such as branches, leaves, calyx, and pod, diffusely whitish-villous; wings rounded at apex, entire (Yaila) . . . . 9. **C. polytrichus** M. B.
+ Plant clothed with appressed or subappressed hairs; wings retuse (forest belt below Yaila; Caucasus) . . . . 8. **C. wulffii** V. Krecz.

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* [The Russian Soviet Federated Socialist Republic.]

77 11. Low plants; branches procumbent or ascending; young branches sparsely pubescent; leaves and calyx often glabrate (except of the Podolian C.paczoskii V.Krecz. with densely hairy young shoots, leaves, and calyx); leaves well developed at anthesis* . . . . 12.

+ Tall plants; branches erect; young branches, leaf, and calyx hairy; leaves rather undeveloped at anthesis . . . . 14.

12. Standard with a distinct brown or, in dry plants, blackish-brown spot at base; branches prostrate and decumbent, hence plant 10–50 cm high; calyx and pod sparsely to densely hairy . . . . 13.

+ Standard with a faint violet spot at base or spotless; branches glabrous, ascending or suberect, hence plant 50–100 (or more) cm high; calyx glabrate; pod slightly pubescent or sometimes glabrous (though in Bessarabia hairy to almost villous); flowers in spikelike inflorescences; leaflets subobovate, 6–8 mm broad (central part of RSFSR) . . . . 4. **C. zingeri** (Nenuk.) V. Krecz.

13. Plants 10–30 cm high, with decumbent branches; young shoots and leaves sparsely pubescent to subglabrous; pod and calyx diffusely hairy; inflorescences 1-sidedly crested; leaflets oblong, 3–4 mm broad (SW Belorussia) . . . . 3. **C. ratisbonensis** Schaeff.

+ Plants to 50–60 high, with ascending branches; young shoots, leaves, calyx, and pod villous; inflorescence spikelike; leaflets elliptic, 4–6 mm broad (Podolia) . . . . 5. **C. paczoskii** V. Krecz.

14. Mountain plants; fruiting pedicels to 1–1.5 cm long, sparsely patulous-villous (W. Caucasus) . . . . 7. **C. hirsutissimus** C. Koch.

+ Steppe and submontane plants; pedicels 3–6 mm long, rather densely covered with appressed hairs . . . . 15.

15. Plants densely covered throughout with long subappressed hairs; flowers in leaf axils 1 or 2 . . . . 2. **C. lindemanni** V. Krecz.

+ Plants covered with short appressed gray hairs; flowers in leaf axils (2) 3–5 . . . . 6. **C. ruthenicus** Fisch.

16(6). Indument of short appressed hairs interspersed with few long hairs; flowers pale yellow, 23–25 mm long . . . . 14. **C. podolicus** Blocki.

78 + Indument exclusively of long spreading or subappressed hairs; flowers yellow, ca. 20 mm long . . . . 17.

17. Plants up to 1 m high, clothed with subappressed hairs; leaflets stiffish, yellowish-green, hairy, lanceolate, acutish, 6–8 mm broad; standard covered above with long hairs; keel crisp-hairy on the back. . . . . 15. **C. rochelii** Wierzb.

+ Dwarf plants, clothed with spreading hairs; stems and branches ascending, blackish; leaflets thin, soft, dark green (blackening), glabrate above, obovate, rounded-obtuse, 10–14 mm broad; standard and keel glabrous or nearly so . . . . 16. **C. aggregatus** Schur.

Cycle 1. DIAXULON (Raf. Sylv. Tell. (1836) 24 pro gen.) V. Krecz. – Flowers axillary, forming a leafy spikelike inflorescence.

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* At this stage of identification one should bear in mind the occurrence of hybrids between species pertaining to this and the next stage of the key (e.g., between C.zingeri and C.ruthenicus; in this connection see note to C.zingeri). All plants relating to this stage (12–13) turn black in drying; among the plants indicated at the next stage (14–15) blackening affects only the Caucasian C.hirsutissimus C.Koch, while the other species retain their grayish-green coloring.

Series 1. **Pseudo-biflorae** V. Krecz. — Plants silvery-pubescent; standard hairy above.

1. **C. borysthenicus** Grun. in Bull. Soc. Nat. Mosc. XLI, 4 (1869) 446 (nomen, sub Cuscuta monogyna); Mohl et Bary in Bot. Zeit. XXVII, 47 (1869) 814 (nomen). — Cytisus sp. nova? Grun. in Bull. Soc. Nat. Mosc. XLI, 2 (1869) 137 (descriptio). — C. biflorus Bess. En. pl. (1822) 74; Eichw. Skizze (1830) 165, ex p., non L'Hérit. — C. ratisbonensis Lindem. Fl. cherson. I (1881) 134, ex p., non Schaeff. — C. biflorus ssp. borysthenicus Pacz. in Act. H. Bot. Jurjev. XV (1914) 95.

Shrub, 70—120 cm high; branches slender, virgate, straight or flexuous, often lodging in blown sands and sprouting again from covered portions; young branches very heavily clothed with appressed whitish-silvery hairs; petioles similarly vested, 6—10 mm long; leaflets elongate-oblanceolate, 2.5—3.5 mm, those of lower leaves up to 6 cm long, 4—6 mm broad, cuneate at base, obtuse or more or less pointed at apex, densely covered on both sides or sometimes only beneath with appressed silvery hairs; flowers few, 1 or 2 in axils of upper leaves, bright yellow; pedicels densely hairy, to 7 mm long; calyx ovoid-tubular, yellowish, 13—15 mm long, covered with minute closely appressed hairs, the upper lip notched, with 2 subcuneate semicircular teeth, longer than the broad-ovate lower lip; standard including claw (2) 2.5—3 cm long, 16—18 mm broad, rounded, yellow, orange toward base, diffusely hairy on the back above; wings 2—2.3 cm long, obliquely point-tipped; keel ca. 3 mm shorter, densely puberulent on the back; pods broadly linear, 2—2.5 cm long and 7—8 mm broad, densely covered with appressed silvery hairs. May—June. (Plate VI, Figure 4).

Riverine blowsands, and dunes. — European part: Bl. (Bug River sands near Balobanovka, Aleshkovskii sand massif, Dnepropetrovsk area, Melitopol', Gorlovka in Bakhmut [Artemovsk] District), L. Don (sands in the Don River system with its tributaries), L. V., Transv. (the Volga near the Mosty—Yakob'evka Railroad in the Spassk District, Iletskaya Zashchita [Sol'-Iletsk], Ural'sk); Caucasus: Cisc. (Kavkavskaya station); W. Siberia: U. Tob. (Kuvandyk, Kustanaya vicinity, Urkach sands in NW Mugodzhary Mountains, Kuguzyuk-kum and Akkum sands). Endemic. Described from sands along the lower course of the Dnieper. Type in Moscow.

2. **C. lindemanni** V. Krecz. in Journ. Bot. URSS, XXV, 3 (1940) 259. — C. elongatus Lindem. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 494; XLIX, 3 (1875) 73; Ejusd. Fl. cherson. I (1881) 124, non W. et K. — C. ruthenicus (forma dense pilosa) Pacz. in Acta H. Bot. Jurjev. XV (1914) 95.

Shrub, 30—60 cm high; branches thickened, erect and ascending, glabrous below, densely covered in upper part with subappressed or spreading hairs (greenish-gray and not silvery as in C. borysthenicus Grun.); petioles densely hairy, to 2 cm long; leaflets oblong-obelliptic, 1.5—2.5 (3.5) cm long, 5—8 mm broad, cuneate at base, point-tipped from a rounded apex, at first appressed-hairy on both sides or only beneath, at length glabrescent or diffusely hairy; flowers pale yellow, paired in the leaf axils, forming a spikelike raceme; calyx tubular, 13—14 mm long, densely tomentose-villous with rather short spreading hairs; standard including claw 2—2.5—2.8 cm long and 1.4—1.6 mm broad, obovate, hairy above, rarely glabrous; wings rounded at apex, 17–20 mm long; keel hairy beneath; pods linear-lanceolate, 3 mm [?] long, 5–6 mm broad, densely whitish-villous. April–May.

Steppe slopes and oak woods. – European part: Bes., U. Dns. (E.), U. Dnp. (Glukhov, Chernigov, Berezna, Zhitomir), M. Dnp. (Petrovka in Priluki District, Karpilovka in Romny District, Grebenniki in Sumy District, former Kapnist virgin land in Lebedin District, Korsun, Belaya Tserkov, Fundukleevka in Chigirin District, Kumagov in Proskurov [Khmelnitskii] District), V.-Don (Kharkov, Akatovka, Kursk, Zadonskoe forestry), Bl. (Kirovo – Lindeman, Stetsovka, Aleksandrovskii District – Pachoskii; Lozovatka, Kosharka, Ekaterinoslav – Graff), L. Don (Starobel'sk County – Prosyanoi Yar; Kamennaya and Khrenovskaya steppes in Bobrov District, Stavropol); Caucasus: Cisc.: vicinity of Kislovodsk (Dzhinala) and Pyatigorsk (Beshtau and Mashuka). Endemic. Described from the vicinity of Kirovo (formerly Elizavetgrad). Type in Leningrad.

Series 2. **Supinae** V. Krecz. – Low plants, turning black in drying; branches trailing or ascending; calyx 10–12 mm long; flowers 16–23 mm long; standard with a distinct spot at base.

3. **C. ratisbonensis** Schaeff. Bot. exped. (1760) tab. titul.; Lindem. Fl. Chers. I (1881) 134, ex p. (excl. syn.); Pacz. in Tr. Bot. Sada Yur'ev. Univ. XV (1914) 92. – C. pubescens Gilib. Pl. lith. inch. IV (1781) 81; Ejusd. Exercit. phytol. I (1792) 249. – C. lithuanicus Gilib. Hist. pl. d'Eur. II 80 (1798) 275. – C. supinus Eichw. Skizze (1830) 165; Ldb. Fl. Ross. I, 519 (quoad pl. lithuan. et volhyn.), non L. – C. biflorus Ldb. Fl. Ross. I (1842) 520 (quoad pl. nonn. Cherson.), non L'Herit. – C. biflorus β minor Schmalh., Fl. sredn. i yuzhn. Ross. I (1895); Pacz., Fl. Poles'ya I (1897), 149 (non Koch).

Shrub, 10–30 (45) cm high, blackening in drying; branches decumbent, usually hidden among the grass, with tips ascending, only initially covered with silvery appressed hairs, later glabrescent, somewhat angled; petioles ca. 1 cm long; leaflets obovate to oblong-obovate or oblanceolate, 1–1.5 (2–2.5) cm long and 0.4–0.5 cm broad, ovate-cuneate at base, point-tipped from rounded apex, glabrous above, diffusely appressed-hairy beneath (in older leaves only on midrib); flowers bright yellow, 1 or 2 in the leaf axils, forming a rather loose 1-sided crested raceme; calyx tubular, somewhat cuneate at base, 10–12 mm long, covered with short appressed silvery hairs, the upper lip shallowly emarginate with ovate teeth, somewhat shorter than the oblong-ovate lower lip; standard including claw 1.6–2.2 cm long and 10 mm broad, suborbicular, with a brownish basal spot and brownish nerves, glabrous above; wings 15–16 mm long, rounded at apex; keel about as long, very slightly pubescent on the back or glabrous; pods linear, 2.5–3 cm long and 4–5 mm broad, covered with long appressed hairs: seeds ca. 2 mm long, olivaceous or light brown to brown, shining. May–August.

Pine woods on sandy soil, and stony outcrops (in the South). – European part: U. Dns. (NE: Bukovina?), U. Dnp. (W. and SW), M. Dnp. (W.), Bl. (Tyaginka in Kherson District; Anan'ev District – Nordman). **Gen. distr.**: Rumania, Hungary, Slovakia, Bohemia, Moravia, and Bavaria. Described from the vicinity of Regensburg in Bavaria.

4. **C. zingeri** (Nenuk.) V. Krecz. in Journ. Bot. URSS, 3 (1940) 260. — C. ruthenicus var. zingeri Nenuk. ex Litw. in Maevsk., Fl. Sr. Ross., Ed. 5 (1917) 133. atque ex Litw. in Sched. ad Herb. Fl. Ross. VIII (1922) 83. — C. ruthenicus Litw. in Maevsk. Fl. Sr. Ross., Ed. 5 (1917) 133; ex p.; Ed. 6 (1933); 428, ex p., non Fisch. et Wol. — C. ratisbonensis Syr., Ill. Fl. Mosk. gub. II (1907) 287, non Schaeff.; Korsh. in Mem. Ac. Sc. Pétersb. 7 ser., VII (1898) 97, ex p. — C. ratisbonensis ssp. ruthenicus Syr. in Acta H. Bot. Jurjev. XIII (1912) 209 (excl. syn. C. lithuanicus et descr. Wolosz.) atque in Ill. Fl. Mosk. gub. IV (1914) 110. — C. biflorus Ldb. Fl. Ross. I (1842) 520 (quoad pl. ex Ross. med.); Fedch. and Fler., Fl. Evr. Ross. (1910) 517 (excl. var.), ex p., non L'Hérit. — C. supinus Mart. Fl. mosq. (1817) 127, non L. — Exs.: HFR No. 311, 2552.

Shrub, 40—120 (150) cm high, blackening in drying; branches ascending, dark brown (in dry plants), slightly angled, glabrous or nearly so, or sometimes the young parts with scattered appressed golden hairs; flowering branches glabrous; petioles diffusely appressed-hairy or subglabrous, well developed at anthesis, 1—1.5 cm long; leaflets oblong or narrowly obovate, (1.5) 2—2.5 (3) cm long, (0.8) 1—1.2 (1.5) cm broad, green, darkening in drying, cuneate at base, rounded at apex, the upper surface glabrous or subglabrous, the lower diffusely appressed-hairy especially along midrib; flowers yellow, 1 or 2 (3) in the leaf axils, forming long spikelike racemes; pedicels slightly hairy, 5—9 mm long; calyx oblongly ovoid-tubular to subcuneate-tubular, glabrous or rarely with scattered short appressed hairs, 10—11 mm long, the upper lip shallowly notched with ovate-cuneate teeth, equaling the lower lip; standard including claw 1.7—2.3 cm long and 1.3—1.4 cm broad, rounded-obovate, dark-yellow-nerved, without basal spot, glabrous above; wings 1.5—1.7 cm long, obliquely rounded; keel shorter, glabrous or subglabrous; pods linear, 2.5—3 cm long and 5—6 mm broad, rather sparsely covered with short appressed hairs, partly glabrous, or glabrous throughout. May—June. (Plate VI, Figure 6).

Dry open pine woods and Pinetum barrens, slopes and wood margins, on sandy soils and sandy loam. — European part: Dv.-Pech. (Palysovo-Ramen'e in the Vologda area), U. V., U. Dnp. (Centr. and E. parts), M. Dnp. (SE part), V.-Don, V.-Kama (south to Irendyk Range), Transv. (N. part, Kinel' and the Buzuluk pine forest); W. Siberia: Ob (Turinsk and Tyumen districts). Endemic. Described from the Chernoretskaya forest estate in the Balakhna District of [the former] Gorkii Territory. Type in Leningrad.

Note. This species is easily distinguishable from C. ruthenicus Fisch. of the forest-steppe and steppe regions that spreads northward beyond the Oka and Volga rivers. A striking feature is the blackening in drying of the green or light green foliage. Another distinguishing character consists in the complete or almost complete absence of indument on all parts except the pods, which are sometimes considerably hairy. In this connection it is important to note that it is only the flowering and fruiting branches of C. zingeri that are normally quite glabrous; the young nonflowering shoots are often appressed-puberulent. It is therefore necessary to refer to flowering and fruiting branches to ensure correct identification. It is also noteworthy that the flowering of C. zingeri takes place when leaves are fully developed and they equal or even surpass the flowers. Thus the few-flowered, much branched and profusely leafy, bright green and almost glabrous brooms of the C.zingeri type are easily distinguishable from the flagellately branched, grayish-green, canescent, scantily leaved and many-flowered brooms of the C.ruthenicus type. Of frequent occurrence and occasionally dominant, in the southern part of the forest belt and in the forest-steppe belt, are hybrids between the two 82 species (C.syreiszczikowii V.Krecz. in Journ. Bot. URSS, XXV, 3 (1910) 261) which differ from C.zingeri above all in larger and more profuse flowers, and also the distinct and often typically grayish-green indument of the flowering branches; from C.ruthenicus in the profusion of leafy shoots, the leaves being well developed at flowering time and blackening in drying.

5. **C.paczoskii** V.Krecz. in Journ. Bot. URSS, XXV, 3 (1940) 261.

Shrub, 30–60 cm high, more or less blackening in drying; branches procumbent or arched-ascending; flowering branches glabrate or hairy; young shoots densely golden- or silvery-hairy; petioles hairy; leaflets elliptic or oblong-obovate, 1.5–2 cm long and 5–6 mm broad, glabrous above, rather densely covered beneath with long appressed hairs; flowers yellow, subsessile, 2–4 in the leaf axils, the spikelike inflorescence somewhat leafy at anthesis; calyx 10–12 (13) mm long, densely tomentose, bilabiate; standard including claw 18–22 (25) mm long, yellow, glabrous above, the dark brown basal spot extending to center and blackening in drying; wings short, brownish yellow; keel pubescent beneath; pods linear, 3 cm long, densely tomentose-villous. May–June.

Leafy and mixed woods. – European part: M.Dnp. (Tarnopol' area, Savran in Balta District), U.Dnp. (Zhitomir). Endemic. Described from near the village of Kidantsy which is near Maksimovka station in the Tarnopol' District. Type in Leningrad.

Note. This species differs from C.lindemanni, with which it often occurs side by side, in the standard being glabrous above, with a dark brown spot, the growth habit, and the tendency to blacken in drying. Possibly a hybrid between C.lindemanni and C.ratisbonensis?

Series 3. **Ruthenicae** V.Krecz. – Branches erect; calyx 12–14 mm long; flowers 23–28 (30) mm long.

6. **C.ruthenicus** Fisch. ex Bess. En. pl. (1822) 29 et 74 (nomen) atque in Ind. pl. Hort. Petrop. (1824) 25 (nomen) et ex Wolosz. in Oesterr. Bot. Zeitschr. XXXVI (1886) 151 (descriptio); Pacz. in Tr. Bot. Sada Yur'ev. Univ. XV (1914) 93 (excl. forma 2); Litw. in Maevsk., Fl. Sr. Ross. Ed. 5 (1917) 133, ex. p. (quoad. pl. stepp. et petr.); Grossh., Fl. Kavk. II (1930) 253. – C.biflorus Ldb. Fl. Ross. I (1842) 520 (excl. pl. ex Ross. media); Boiss., Fl. Or. II (1872) 30 (quoad. pl. cauc.); Fedch. and Fler., Fl. Evr. Ross. (1910) 517 (excl. var.) ex. p., non L'Hérit. – C.supinus Ldb. Fl. Ross. I (1842) 520 (quoad pl. ex Ross. austr.), non L. – C.supinus-volgensis Fisch. Cat. Hort. Gorenk. (1808) 110; (1812) 68 (nomen). – C.hirsutus M. B. Fl. taur.-cauc. II (1808) 165 (excl. syn.); Ldb. Fl. Ross. I, 519 (quoad pl. cauc.), non L. – C.pilosus Pall. Reise II (1773) 255, 408 etc. (nomen). – C.communis Lindem. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 494; XLIX, 3

(1875) 73 (nomen). — C. ratisbonensis Korsh. in Mém. Ac. Sc. St. Pétersb. VII, 1 (1898) 97 (f. stepposa). — C. caucasicus Grossh. in Grossh. et Schischk. Schedae ad Fl. orient. exs. IX—XVI (1928) atque in Fl. Kavk. II (1930) 253.

Shrub, 60—200 cm high; branches erect or flexuous, virgate, grayish brown or gray, young shoots as well as stems and branches in upper part densely covered with short appressed whitish-gray hairs, glabrous elsewhere; petioles appressed-hairy, 1—5—2 [?] cm long; leaflets elliptic-lanceolate, 1—1.6 cm long and 4—5 (8) mm broad (at flowering merely 6—7 mm long and 2—3 mm broad), subcuneate toward base, mucronate from rounded apex, the upper surface rather densely appressed-hairy at first, later diffusely so, the lower surface rather densely hairy; flowers pale yellow, (2) 3—5 in the leaf axils, in leafless many-flowered spiciform racemes; pedicels 3—5 mm long; calyx ovoid-tubular, 12—13 mm long, densely covered with short appressed hairs, the upper lip with ovate-unguiform teeth, somewhat longer than the lower; standard including claw 2.2—2.5—2.8 (3) cm long, 1.6—1.8 mm broad, obovate, glabrous above; wings 1.8—2 cm long, obliquely rounded; keel shorter than wings, crisp-hairy on the back; pods 3—3.5 cm long, 6—8 mm broad, densely shaggy with long subappressed hairs. May—June.

Steppes; also steppe and stony steppe mountain slopes. — European part: Bes., U. Dns., U. Dnp. (Ukraine and SE Belorussia), M. Dnp., V.-Don (along Oka River and in S. part; also in Galich'ya Gora in Orlovskii District), U. V. (Oka River), V.-Kama (southern forest-steppe part), Transv., Bl., L. Don, L. V., Crim.; Caucasus: Cisc., W. Transc. (N. part of Black Sea coast and Kutaisi), Dag. (?), E. Transc.; W. Siberia: U. Tob. Endemic. Described from Yanov near Lvov. Type in Lvov.

Note. Concerning the characters distinguishing this species and its hybrids from C. zingeri, see note to C. zingeri. In the Caucasus C. ruthenicus displays variability. Plants from South Ossetia, the area of Borzhomi, Abas-tuman and Kutaisi, associated with mountain woods, are characterized by strongly developed foliage and branches; their indument is scantier (the branches, leaves, and calyx almost glabrous), and they turn black in drying; they apparently constitute a distinct race analogical to C. zingeri in the forest belt of the Soviet Union. C. ruthenicus forms hybrids with C. lindemanni (C. czerniaevii V. Krecz. in Journ. Bot. URSS, XXV, 3 (1940) 26), that differ from C. lindemanni in their gray indument, short-hairy calyx, and glabrous standard (Kharkov, Chuguev area).

7. **C. hirsutissimus** C. Koch in Linnaea, XIX (1847) 62. — C. colchicus N. Alb. Prodr. fl. Colch. (1895) 53, Grossh., Fl. Kavk. II (1930) 253. — C. biflorus var. longipedunculatus Somm. et Lev. in AHP XVI (1900) 110. — C. austriacus Boiss., Fl. Or. II (1872) 53 (quoad pl. cauc. orient); Lipsky in Tr. Tifl. Bot. Sada IV (1899) 271, non L.

Shrub 20—40 cm high; branches decumbent, ascending at base, the young upper parts covered with scattered whitish and stiffish rather long spreading villi or subappressed hairs, the older parts glabrescent; petioles patulous-hairy, 0.7—2 cm long; leaflets elliptic-obovate, to obovate, 1—2 (3) cm long, 0.8—1 (1.5) cm broad, ovate at base, rounded at apex, submuticous, glabrous above or initially diffusely appressed-hairy, covered beneath with scattered spreading hairs, especially on midrib; flowers yellow or rosy-yellow, 1—3 in the leaf axils, forming a spiked raceme; pedicels villous, 1—1.5 cm long; calyx ovoid-tubular, 13—14 mm long, rather densely villous-pubescent, the upper lip shallowly notched with rounded obscurely tipped teeth, as broad [?] as the lower lip; standard broad-clawed, 2.2–2.5 cm long and 1.5 cm broad, broadly obovate, glabrous above; wings 1.8–2 cm long, obliquely round-tipped; keel shorter, hairy on midnerve or sometimes glabrous; pods linear, 3 cm long, 5–6 mm broad, covered with long subapressed hairs. May–July.

Exposed places and scrub in the forest zone of mountains, right up to the timberline.— Caucasus: Cisc. (Belaya-Laba interfluve), W. Transc. **Gen. distr.**: Turkey (Artvin district, Lazistan). Described from the S. coast of the Black Sea in As. Min. Type in Berlin; syntype in Leningrad.

Series 4. **Pygmaeae** V. Krecz.— Low mountain plants, with trailing branches and obovate leaves; standard pubescent above. Other representativ of the order occur in Asia Minor, the Balkans, and S. Europe.

8. **C. wulffii** V. Krecz. in Journ. Bot. URSS, XXV, 3 (1940) 262.

Shrub, 5–20 cm high; branches to 50–80 cm long, trailing, only at tips ascending, rather smooth, fuscous; young branches covered toward their tips with rather long subappressed whitish hairs, the older parts glabrescent; petioles more profusely hairy, to 2 cm long; leaflets obovate-lanceolate, 1–1.5 cm long and 4–7 mm broad, cuneate-ovate at base, rounded at apex or more often acute or obscurely mucronulate, diffusely appressed-hairy on both sides; flowers yellow, 1 or 2 in the leaf axils, forming 1-sided crested racemes at ends of branchlets; pedicels to 7–10 mm long; calyx ovoid-tubular, 14–17 mm long, rather densely covered with long subappressed hairs, the upper lip shallowly notched with rounded-obtuse teeth, slightly exceeding the lower lip; standard including claw 2.4–3 cm long and 85 1.2–1.5 cm broad, rounded-obovate, appressed-hairy on the midnerve above; wings 2–2.3 cm long, retuse; keel shorter by 2 mm, rather densely crisp-hairy on the midnerve; pods broadly linear-lanceolate, slightly curved, ca. 3 cm long and 6–7 mm broad, silvery with dense long appressed hairs. May–July.

Pine woods and stony places near the timberline.— European part: Crim. (mountainous part); Caucasus: W. Transc. (from Belaya-Laba interfluve to Novorossiisk; Mt. Sukko, Novogir Range, Raevskaya, Kedrovyi Bugor, etc.). Endemic. Described from the Uchan-su forest. Type in Leningrad.

Note. Related to the Balkan C. jankae Velen. and to C. pygmaeus Willd. sen. lat. of Asia Minor. It differs from these species in its broader leaflets, larger flowers, and the sparser and coarser indument. The very similar C. polytrichus M. B., that grows at higher altitudes (on the Crimean Yaila itself), is distinguishable by the lighter angularly rugose bark, the villous indument of all parts, and the entire wings.

9. **C. polytrichus** M. B. Fl. taur.-cauc. III (1819) 477; Boiss., Fl. Or. II, 51; Fedch. and Fler., Fl. Evr. Ross., 547.— C. hirsutus M. B. Fl. taur.-cauc. II (1808) 165, ex p.; Ldb. Fl. Ross. I (1842) 519, non L.— C. hirsutus ssp. polytrichus Briq. Etudes Cyt. Alp. Marit. (1894) 171 (quoad pl. taur.).

A sprawling shrub, 10–20 cm high; branches prostrate, angularly rugose, light-colored, villous with scattered long whitish hairs; petioles villous, to 1.5–2 cm long; leaflets obovate, 1.5–2 cm long and 5–6 mm broad, cuneate at base, rounded at apex, obscurely mucronulate, villous on both sides with scattered white hairs; flowers yellow, 1 or 2 in the leaf axils, racemed at ends of branches; calyx tubular, ovoid-conic, 1.5–1.7 cm long, diffusely villous with scattered long hairs, the upper lip notched with rounded-triangular teeth, slightly exceeding the 2-toothed ovate lower lip; standard including claw 2.6–3 cm long and 12–14 mm broad, slightly retuse, with scattered hairs on the back; wings 2–2.2 cm long, round-tipped; keel crisp-hairy beneath; pods 3 cm long and 5 mm broad, diffusely villous. May-July.

Yaila rocks, above the timberline. — European part: Crim. (mountains). Endemic. Described from the Crimean Yaila. Type in Leningrad.

Cycle 2. AULONIX (Raf. Sylv. Tell. (1836) 25, pro gen.) V. Krecz. — Flowers crowded at ends of branches in corymbose-capitate inflorescences.

Series 1. **Austriacae** V. Krecz. — Flowers borne only on young shoots; leaflets lanceolate. Indument very dense. — Other representatives of the series occur in Hungary, Czechoslovakia, and the Balkans.

10. **C. austriacus** L. Sp. pl. ed. 2 (1763) 1041; Ldb. Fl. Ross. I, 519 (excl. var. β). — C. austriacus γ, luteus Knapp, Pflz. Gal. (1872) 395, non Neilr. — C. supinus var. γ L. Sp. pl. (1753) 740. — C. supinus ssp. austriacus Briq. Etudes Cyt. Alp. marit. (1894) 175. — C. graniticus Rehm. Notiz Veget. Schw. Meeres (1872) 50? 59? non Pacz. — Exs.: HFR 169; Fl. pol. exs. 420.

Shrub, 30–60 cm high; branches erect, densely appressed-puberulent, with inflorescences mostly confined to the young shoots and thus branches characteristically corymbose-paniculate; petioles appressed-pubescent; leaflets lanceolate to narrowly lanceolate, 1. 5–2.5 cm long and 2–4 mm broad, narrowly cuneate at base, more or less distinctly point-tipped, densely appressed-hairy on both sides; inflorescence capitate, of 6–10 flowers borne at tips of young shoots; flowers golden-yellow to pale yellow; calyx conic-campanulate, 8–10 mm long, rather densely covered with long subappressed hairs, the upper lip rather deeply notched with 2 acutely triangular teeth, slightly exceeding the 2-toothed oblong-triangular lower lip; standard 17–20 mm long and 7–8 mm broad, hairy above; wings 14–15 mm long; keel shorter, crisp-hairy on midnerve; pods villous, not more than 2 cm long, 5 mm broad. June–August. (Plate VI, Figures 1 and 2).

Scrub, wood margins, and steppe slopes. — European part: Bes., U. Dns., U. Dnp., M. Dnp., Bl., V.-Don (SW part), L. Don, Crim. (Simferopol'); Caucasus: Cisc., (Caucasus — Parrot, Stavropol, Georgievsk, Biryuch'ya Spit). **Gen. distr.**: Centr. Eur. Described from Austria. Type in London.

Note. Compared with European plants, the indument of the USSR plants is shorter, sparser, and grayish rather than silvery. This feature is most pronounced on the midrib of leaflets which is clearly visible and not concealed by a dense cover of hair. The USSR plants have paler flowers,

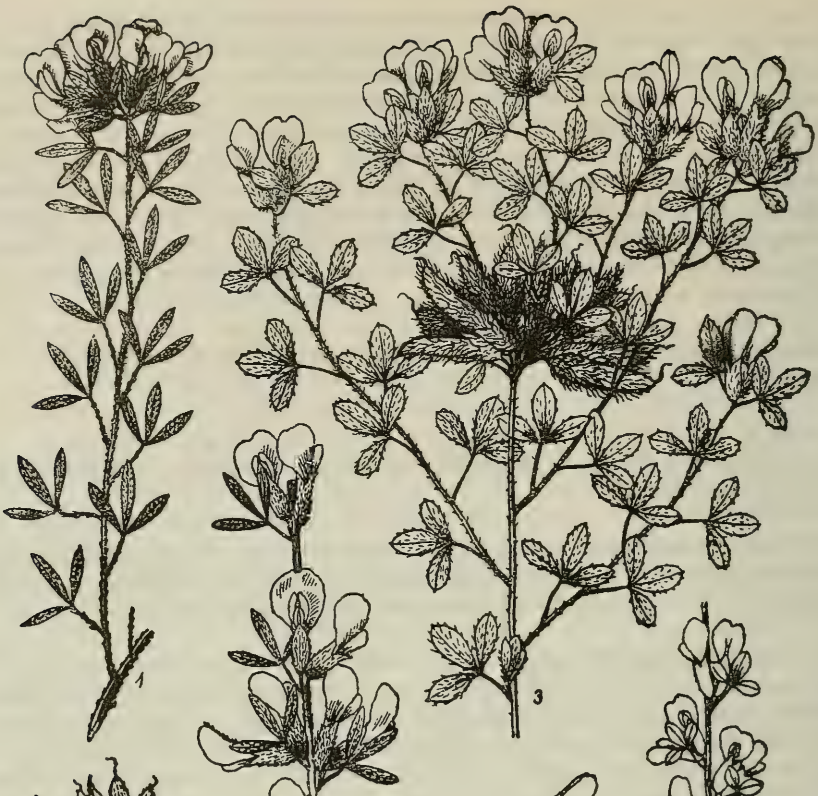

PLATE VI. 1, 2 – Cytisus austriacus L., flowering and fruiting branchlets; 3 – C. albus Hacq.; 4 – C. borysthenicus Grun.; 5, a, b, c, d – parts of a Cytisus flower; 6 – C. zingeri (Nenuk.) V. Krecz.

broader and obtuser leaflets, more sparsely and diffusely hairy calyx, and they constitute perhaps a distinct race (C. graniticus Rehm.).

Series 2. **Leucanthae** V. Krecz. — Flowers borne only on the young shoots; leaflets oblong; indument scattered; leaves glabrate above. — Other representatives of this series occur in Rumania.

11. **C. blockii** V. Krecz. in Journ. Bot. URSS, XXV, 3 (1940) 256. — C. leucanthus Eichw. Skizze (1830) 165, ex. p., non W. et K. — C. austriacus β leucanthus Ldb. Fl. Ross. I (1842) 519, ex p. — C. albus Kern. Abhäng. Pflzgest. (1869) 5, ex p., non Hacq. — C. variabilis Blocki in 39 Oesterr. Bot. Zeitschr. XXXIV, 1884 (1885) 427 (quoad pl. ex Galicia orient.). — C. kerneri Blocki in Allg. Bot. Zeitschr. I (1895) 137, non Schultz, Kanitz et Knapp (1866).

Shrub, 20—40 cm high; branches rather slender, ascending, with flowers only on young shoots, hence flowering branches corymbose-paniculate; young branches rather sparsely covered with short appressed hairs, their lower part and old branches with scattered hairs (occasionally indument consisting of short as well as scattered long hairs); petioles hairy; leaflets oblong-obovate to obovate-lanceolate, 1.3—2.3 cm long, 0.4—0.6 cm broad, rounded-cuneate at base, mostly obtuse at apex, rarely obscurely point-tipped, covered on both sides with long appressed hairs, finally glabrescent; inflorescences capitate-corymbose, at ends of equal young shoots, 5—10-flowered; flowers pale sulfureous to pale yellow; calyx ovoid-tubular, broad-ovoid at base, 10—12 mm long, with long subappressed hairs, sometimes glabrate, the upper lip shallowly notched with 2 almost right-angled triangular teeth, equaling the ovate lower lip; standard including claw (18) 20—25 mm long, 8—10 mm broad, with a brownish spot at base, with scattered long hairs above; wings more or less retuse, 15—17 mm long, glabrous or diffusely hairy; keel short by 1—1.5 mm, crisp-hairy on the back; pods linear-lanceolate, 2 cm long and 4 mm broad, slightly curved, densely villous. May—July.

Wood margins and scrub. — European part: Bes., U. Dns., M. Dnp. (Bratslav, Mukhovtsy, Pyzhovka, Ushitskii District and Kitai-gorod near Kremenets, Verbka, Kamenets District). Endemic. Described from Gleshchava between Tarnopol' and Khorostkov in the western Ukraine. Type in Lvov.

12. **C. litwinowii** V. Krecz. in Journ. Bot. URSS, XXV, 3 (1940) 256. — C. pallidus Litw. in Trav. Mus. Bot. Petrograd. XV (1916) 130, non Kern.

Shrub, 20—50 cm high; branches erect, with flowers only on young shoots, sparingly appressed-puberulent, often subappressed-hairy toward summit; leaflets oblanceolate, 2—3.5 cm long and 0.4—0.8 cm broad, mucronate from rounded apex, glabrate above, with scattered long appressed hairs beneath; flowers golden-yellow, 6—8 at tips of young branches; calyx ovoid-campanulate, ovoid at base, 10—12 mm long, diffusely patulous-hairy to glabrate, the slightly notched upper lip with broad right-angled triangular teeth, slightly exceeding the ovate lower lip; standard 17—19 (20) mm long, hairy above; wings 12—13 mm long, hairy beneath; pod (?). May—July.

Mountain slopes with chalky subsoil and shrubby vegetation. – European part: V.-Don: Bekaryukovka, together with Daphne julia, near Korocha. Endemic. Described from the Pushkarnyi Forest near Korocha. Type in Leningrad.

Note. A chalk-loving race, closely resembling C. blockii V. Krecz. and possibly its postglacial derivative.

Series 3. **Albae** V. Krecz. – Flowers borne on old as well as young shoots; leaflets obovate.

13. **C. albus** Hacq. Neue Reise dac. sarmat. Karp. I (1790) 49; Kern. Abhäng. Pflzgest. (1869) 5. – leucanthus Bess. En. pl. (1822) 29; Eichw. Skizze (1830) 165, ex. p., non W. et K. – C. austriacus β leucanthus Ldb. Fl. Ross. I (1842) 519, ex. p. – C. austriacus γ albus Neilr., Knapp, Pflz. Gal. (1872) 394. – C. variabilis Pacz. in Act. H. Bot. Jurjev. XV (1914) 99 (quoad pl. adpresse pilos.), non Blocki.

Shrub, 50–80 cm high; branches suberect; inflorescences borne on preceding year's branches as well as on shoots of the current year, hence flowering branches paniculate in appearance; young branches densely covered with short appressed hairs, those of the preceding year diffusely hairy, often with some long hairs; petioles appressed-hairy, 1–2 cm long; leaflets lance-obovate to oblong-obovate, 2–3 cm long and 0.7–1.2 cm broad, cuneate at base, obtuse to subacute, appressed-hairy sparsely above and more densely beneath; inflorescences capitate, of 5–8 flowers, at ends of previous and current years branches; flowers white or pale yellow, rarely yellow; calyx campanulate, conic, 10–12 mm long, sparsely patulous-hairy, the upper lip shallowly notched with triangular-ovate teeth, slightly exceeding the 2-toothed oblong-ovate lower lip; standard 16–20 mm long and 6–8 mm broad, ciliate above toward base; wings 14–17 mm long; keel shorter, hairy on the back; pods lance-linear, 2–3 cm long, 5–6 mm broad, densely villous. June-August. (Plate VI, Figure 3).

Scrubby slopes. – European part: Bes., U. Dns., M. Dnp. (Konstantinograd [Krasnograd] District, Zapadintsy (Rogovich), Gorodok near Kremenets). **Gen. distr.:** Slovakia. Described from Zaleshchiki in the western Ukraine.

14. **C. podolicus** Blocki in Allg. Bot. Zeitschr. I (1895) 137. – C. capitatus Bess. En. pl. (1822) 39; Eichw. Skizze (1830) 165; Ldb. Fl. Ross. I, 519 (excl. specim. uralens.), non Scop. – C. variabilis Blocki in Oesterr. Bot. Zeitschr. XXXIV, 1884 (1885) 427, ex p.; Pacz. in Act. H. Bot. Jurjev. XV (1914) 99 (quoad pl. erecto pilos.).

91 Shrub, 30–50 cm high; branches slightly thickened, with inflorescences on shoots of the preceding as well as the current year, densely covered, especially above, with short appressed as well as long spreading hairs; petioles and pedicels similarly hairy, hence the whole plant shaggy in appearance; leaflets subelliptic-lanceolate, 2.5–3 cm long and 7–10 mm broad, ovate at base, mucronate from rounded apex, glabrate above, diffusely patulous-pilose beneath; flowers pale yellow, in heads of 10–12, at ends of preceding and current year's branches; calyx ovoid-tubular, 12–13 mm long, densely patulous-pilose to villous, the upper lip with ovate-triangular teeth, slightly longer than the ovate lower lip; standard including claw 2.3–2.5 cm

long, rather intensely brown at base, hairy above; wings 1.8–2 cm long, sparingly hairy; keel shorter, hairy beneath; pods linear-lanceolate, densely villous, 2.5–3 cm long and 5–6 mm broad. June–July.

Dry calcareous slopes.– European part: M. Dnp. (W. part), U. Dns. (E. part), Bes. (N.). Endemic. Described from Verenchanka and Kadobestya in NE Bukovina. Type in Lvov.

15. **C. rochelii** Wierzb. in Griseb. et Schenk in Wiegm. Arch. XVIII (1852) 292; Hormuzaki in Oesterr. Bot. Zeitschr. XLI (1911) 195. – C. austriacus β major Roch. ex Heuff. in Abh. Z. B. G. Wien VIII (1855) 50. – C. supinus Knapp, Pflz. Galiz. (1872) 395, ex p. – Exs.: Rchb. Fl. Germ. exs. No. 1734.

Shrub, to 1 m high, yellowish green; branches numerous, divaricate, with inflorescences on old as well as young branches, hence flowering branches paniculate in appearance; stems and branches brownish, rather densely covered with spreading or subappressed ferruginous hairs; petioles similarly hairy; leaflets lanceolate to ovate-lanceolate, cuneate at base, acute, rigid, covered on both sides, more sparsely above, with long appressed hairs, 2–2.5 cm long and 6–8 mm broad; inflorescence capitate-corymbose, of 12–18 flowers; flowers sulfureous; calyx conic-campanulate, 10–12 mm long, rather densely clothed with long subappressed hairs; standard 18–20 mm long, covered above with long appressed hairs; wings 15–17 mm long; keel shorter, crisp-pubescent on the back; pods falcate, villous.

Wood margins. – European part: U. Dns. – vicinity of Chernovits (Gormuzaki). **Gen. distr.**: Hungary, Rumania, Yugoslavia (Carpathians). Described from the Banat: Illadya.

Series 4. **Capitatae** V. Krecz. – Indument of long, more or less spreading hairs; leaflets broadly obovate; inflorescence few-flowered. Other representatives of the series in S. Europe.

16. **C. aggregatus** Schur, En. pl. Transs. (1866) 149; Hormuzaki in Oesterr. Bot. Zeitschr. XLI (1911) 195. – C. capitatus Aschers. et Gr. Syn. VI, 2 (1907) 334 ex p., non Scop. – C. supinus Kern. Abhäng. Pflanzg. (1869) 11, non L. – C. hirsutus Knapp, Pflz. Galiz. (1872) 394 ex p., non L. – Exs.: Fl. hung. exs. No. 441.

Shrub, 30–50 cm high, dark green, slightly blackening, with sturdy ascending stems; branches erect; inflorescences on old as well as young branches; stems and branches black, sparingly covered, as are the petioles, with divaricate whitish-yellow hairs, more densely in upper part of the plant; leaflets obovate, soft, glabrous or subglabrous above, sparsely appressed-pillose beneath, cuspidate from rounded apex, rounded-cuneate at base, 1.5–2.5 cm long and (8) 10–14 mm broad; inflorescences capitate-corymbose, 4–8 (10)-flowered; flowers yellow; calyx ovoid-campanulate, 10–12 mm long, rather sparsely subpatulous-pilose; standard 20 mm long, glabrous above or nearly so; wings 15–16 mm long; keel shorter, glabrous or subglabrous on the back; pods almost straight, diffusely patulous-villous. June–July.

Scrub and barren slopes. – European part: U. Dns. (Tsurik near Chernovits – Gormuzaki). **Gen. distr.**: Hungary, Slovakia, Rumania. Described from Transylvania.

SPECIES OF DUBIOUS POSITION

17. **C. skrobiszewskii** Pacz. in Acta Soc. Bot. Pol. II, 1 (1924) 65. — C. graniticus Pacz. in Acta H. Bot. Jurjev. XV (1914) 97, non Rehm. — C. leucanthus Eichw. Skizze (1830) 164 (pro pl. Cherson.). — C. austriacus β leucanthus Schmalh., Fl. sredn. i yuzhn. Ross. I (1895) 218 (quoad. pl. ex Vosniessensk).

Shrub, 19—30 cm high, dark green, blackening in drying; branches slender, distinctly angled, ascending, rather sparsely appressed-puberulent, in age glabrescent; petioles to 10 mm long; leaflets elliptic or obovate, 10—18 mm long, 5—6 mm broad, rounded-obtuse at apex, sparingly appressed-pubescent on both sides; inflorescence spuriously terminal; flowers 2—4 at ends of branches, white, rarely pale rose; pedicels 2—3 mm long; calyx tubular-conic, 11—12 mm long, sparsely appressed-hairy, slightly notched with short obtuse subunguiformly recurved teeth; standard 18—22 mm long, 10 mm broad, glabrous above, the upper part of claw margined with long white cilia; wings 15—17 mm long, rounded at apex, not retuse; keel slightly hairy beneath; pods linear-acinaciform, 3—4.5 cm long and 5—6 mm broad, densely appressed-hairy. May—July.

93 Limestone and marl slopes of gullies and river valleys. — European part: Bl. — along the Gromekleya, Tyaginka, and Ingulets rivers; near Kherson and Nikolaev; Voznesensk, Dnepropetrovsk area. Endemic. Described from the Kherson area: Tyaginka. Type in Leningrad.

Genus 787. **SAROTHAMNUS*** WIMM. **

Wimm. Fl. Schles. (1832) 278.

Plants with prominently angled branches and much reduced leaves; flowers solitary, in lower part of leafy branches; calyx infundibular-campanulate, ca. 5 mm long, obscurely bilabiate, with inconspicuous teeth, the upper lip 2-toothed, the lower 3-toothed; flowers ca. 2 cm long, the petals unequal; standard rounded at apex; keel pubescent on the margin; style spiral, with capitate stigma; pods slightly stipitate, not thickened at the sutures; stamens 10, monadelphous. Russian name: zharnovets.

1. **S. scoparius** (L.) Wimm. ex Koch, Deutschl. Fl. V (1839) 82; Ldb. Fl. Ross. I, 515. — S. vulgaris Wimm. Fl. Schles. (1832) 273; Knapp, Pflz. Gal. (1872) 393. — Spartium scoparium L. Sp. pl. (1753) 709. — S. angulosum Gilib. Fl. lith. inch. IV (1781) 79; ejusd., Exerc. phytol. I (1792) 247. — Cytisus scoparius Link, Enum. hort. Berol. II (1822) 241; Schmalh., Fl. sredn. i yuzhn. Ross. I (1895) 217. — Genista juncea Eichw. Skizze (1830) 165.

Shrub, 30—150 cm high, blackening in drying; branches with narrowly winged angles, erect or ascending, glabrous, almost leafless at fruiting; leaves decreasing in size up the stem; petioles sparingly villous-pilose, to 1 — 1.5 cm long; leaflets oblong-obovate, 5—15 mm long and (2) 3—5 mm broad, or the uppermost even smaller, rounded at apex, glabrous or subglabrous above, sparingly appressed-hairy beneath; flowers light yellow, solitary in the leaf axils close to the base of branches; pedicels long, with few obsolescent caducous scalelike bracteoles; calyx campanulate-infundibular, glabrous, 4–5 mm long, shallowly bilabiate, the upper lip 2-toothed, the lower with 3 closely approximate short teeth; standard including claw 2–2.3 cm long, applanately galeate, recurved, glabrous, broadly rounded-subcordate, acutish; wings of same length, obtusely acuminate; keel broad, obtuse, densely pubescent on the back; pods oblong-linear, 4–5 cm long and 8–10 mm broad, whitish-villous on the sutures, the faces glabrous. Seeds ellipsoid-ovoid, 3 mm long, yellowish gray. May–June. (Plate V, Figure 2).

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* From Greek saros — broom, and thamnos — shrub, implying a broomlike shrub.

** Treatment by V. I. Krechetovich.

Coniferous and mixed woods.– European part: Balt. (S.), U. Dnp. (nearly to the Dnieper), U. Dns., Bes. (N.). **Gen. distr.**: W., Centr. and S. Eur., S. Scand. Described from S. Europe. Type in London.

Tribe 4. **TRIFOLIEAE** Bronn. Diss. Legum. (1822) 171.– Stamens united, mostly diadelphous; leaves compound, with 3–5 mostly toothed leaflets. Herbs or undershrubs.

Genus 788. **ONONIS**[*] L.[**]

L. Gen. Pl. (1754) 321.

Calyx deeply and narrowly 5-lobed, open in fruit; corolla pink or yellow; keel beaked; filaments of all 10 stamens united into a tube; pod short, slightly inflated, ovaloid or ovoid, sometimes inequilateral, or linear, pendulous. Perennial herbs or undershrubs with simple or 3-foliolate leaves. Russian name: stal'nik.

1. Flowers yellow; all leaves 3-foliolate or only the floral 1-foliolate; plants unarmed . . . . 2.
+ Flowers pink; only the lower and sometimes median leaves 3-foliolate, rarely unarmed (Section Acanthononis Willk.) . . . . . 3.
2. All leaves 3-foliolate; flowers ca. 10 mm long, sessile, in dense leafy spikelike inflorescences; pod exceeded by calyx teeth, ca. 7 mm long (Section Bugranoides DC.) . . . . 1. **O. pusilla** L.
+ Floral leaves 1-foliolate; flowers 16–18 mm long, on pedicels ca. 3 cm long; pod linear, pendulous, ca. 2–2.5 cm long . . . . **O. natrix** L.[†]
3. Flowers 15–20 mm long; corolla twice as long as calyx . . . . 4.
+ Flowers 10–13 mm long; corolla about as long to at most one-third as long again as calyx . . . . 6.
4. Flowers 15–20 mm long, always paired in the axils of floral leaves, forming dense spiked inflorescences at the ends of stems and branches; leaflets rather large, 1.5–3 cm long . . . . 2. **O. arvensis** L.

[*] Name coined by Dioscorides; derived from Greek ο ɔn – donkey. Donkeys readily eat the young shoots of certain species of this genus (Wittstein).

[**] Treatment by O. A. Murav'eva.

[†] We have no collections of this species in our herbarium, but we include it in the key on account of the report by Maiorov: "The occurrence of this species in the flora of the Crimea has not yet been confirmed. The plant was encountered on a single occasion by Steven near Simferopol' and it may have been a temporary escape from cultivation" (Vestn. Tifl. bot. sada 1919, No. 1, p. 18).

+ Flowers 15–17 mm long, solitary in the leaf axils or very rarely paired, not forming densely spiked inflorescences; leaflets smaller . . . .

5. Stems procumbent at base, hairy all round; mature pod shorter than calyx . . . . 3. **O. repens** L

95 + Stems erect or at base slightly ascending, with hairs in a line alternating from one internode to the next; mature pod equaling or slightly exceeding the calyx teeth . . . . 4. **O. spinosa** L

6. Seeds smooth; stems often covered with long white hairs . . . . 6. **O. leiosperma** Boiss

+ Seeds minutely tuberculate 7

7. Flowers paired in the leaf axils, rarely solitary, forming rather dense spikelike inflorescences at the ends of branches; hairs in a line at least on some internodes, rarely around the stem throughout; spines few . . . . 7. **O. intermedia** C. A. M

+ Flowers solitary in the leaf axils, rarely paired, not forming dense spikelike inflorescences; stems hairy all round, rarely glabrate, sometimes markedly flexuous; spines numerous . . . . 5. **O. antiquorum** L

Section 1. **BUGRANOIDES** DC. Prodr. II (1825) 164. – Plants unarmed; flowers yellow.

1. **O. pusilla** L. Syst. Nat. ed. 10, t. II (1758) 1159; Grossg., Fl. Kavk. II, 253. – O. cherleri L. Sp. pl. II (1763) 1007, p. p.? – O. columnae All. Syn. meth. hort. Taur. (1774) 77 et Fl. Pedem. I (1785) 318; L. Sp. Pl. ed. IV (Willd.) III, 2 (1800) 993; Ldb. Fl. Ross. I, 514; Shmal'g., Fl. I. 220. – Ic.: All. Fl. Pedem., t. XX, f. 3.

Shrub; stems erect or ascending, woody at base, 6–30 cm long, covered with simple glandular hairs, in lower part bearing spiny remnants of petioles of dead leaves; leaves all 3-foliolate; petioles as long as or slightly longer than leaflets, the middle leaflet petiolulate; leaflets 7–15 mm long, 2–7 mm broad, oblong, rarely oblong-obovate, sometimes cuneate at base, mucronate, the margin sharply serrate; stipules linear-lanceolate, sharply serrate, half length of petiole; flowers subsessile, solitary in the axils of upper leaves, forming a dense spike; calyx 8–11 mm long, the ovate lobes awn-tipped; corolla yellow, shorter than to rarely as long as calyx; standard 8–9 mm long, oval to suborbicular, short-clawed; wings oblong, slightly shorter than standard; keel equaling or slightly exceeding wings; pod ca. 7 mm long, shorter than calyx, ovaloid or asymmetrically ovoid, subrhomboid when young; seeds 2–4, minutely tuberculate. June–September. (Plate VII, Figure 2).

Dry stony slopes, sometimes among scrub. – European part: Crim.; Caucasus: Cisc. (vicinity of Kislovodsk), W. Transc. (Gelendzhik), S. Transc.
96 (Karabakh) and E. Transc. **Gen. distr.**: S. and Centr. Eur., N. Afr., As. Min., and W. Iran. Described from S. Europe. Type in London.

Section 2. **ACANTHONONIS** Willk. in Willk. et Lang Prodr. Fl. Hisp. III (1880) 392. Plants spiny, rarely unarmed; flowers pink.

Note. The section Acanthononis Willk. contains a number of insufficiently explored species that tend to hybridize wherever they grow together. As a result of hybridization and due to ecological influences, various forms of dubious taxonomic standing have arisen. On Soviet territory the greatest number of such forms occurs in the Caucasus and the Crimea. As these forms are linked by transitional stages, and their stability is doubtful and in need of checking by experimental evidence and field observation, it is not possible to set them up as independent taxa.

2. **O. arvensis** L. Syst. Nat. ed. 10, II (1759) 1159. — O. spinosa α mitis L. Sp. pl. II (1763) 1006, p. p. — O. hircina Jacq. Hort. Vindob. I (1770) 40; Shmal'g., Fl. I, 220. — 513; Grossg., Fl. Kavk. II, 254; Kryl., Fl. Zap. Sib. VII, 1586. — O. spinosa var. β L. Sp. pl. (1753) 716, p. p. — O. altissima Lam. Dict. IV (1797) 506. — O. procurrens Ldb. Fl. Alt. III, 250 (non Wallr.). — Ic.: Jacq. l. c., tab. 93; Hall. Fl. Deutschl. 23 (1885) tab. 2327.

Perennial; stem to 80 cm long, erect, rarely ascending (var. subrepens Schmalh.), branched, covered all round with simple and glandular hairs, unarmed (var. inermis Ldb.) or spiny (spinescens Ldb.); lower and median cauline leaves 3-foliolate, the upper simple; leaflets 1.5—3 cm long, 0.5—1.5 cm broad, oval or oblong-elliptic, sharply denticulate, glandular-pubescent on both sides, more profusely beneath, viscous and disagreeably scented; stipules large, broad-ovate, clasping, about equaling and adnate to petiole; flowers short-pediceled, paired in the leaf axils, forming dense spiciform inflorescences at the ends of stem and branches; calyx ca. 10 mm long; corolla twice as long as calyx; standard 15—20 mm long, broad-oval, tapering to a short claw; wings half as long as to but slightly shorter than standard, the oblong limb about four times length of the claw; keel slightly shorter than to equaling wings; pod exceeded by calyx teeth, ca. 7 mm long and 5—6 mm broad, ovaloid or broad-ovoid, hairy; seeds 2—4, minutely tuberculate. June—August. (Plate VII, Figure 3).

Solitary or forming close stands in meadows, field borders, scrub, and sometimes riverbanks; growing on clayey, calcareous or chernozem soil. — European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: all regions; W. Siberia: Alt.; E. Siberia: Yenis. (SW part). **Gen. distr.:** S. Scand., Centr. Eur., S. part of Europe. Described from Europe. Type in London.

Note. Some of the Crimean specimens are characterized by longer hairs and horizontally spreading spines.

Economic importance. The roots contain the glycoside ononine which acts as a mild diuretic. Roots dug up in fall used to be exported as medicinal raw material.

3. **O. repens.** L. Sp. pl. (1753) 717; Ldb. Fl. Ross. I, 513; Shmal'g., Fl. I. 222. — O. procurrens Wallr. Sched. Crit. (1822) 381: DC. Prodr. II (1825) 162. — Ic.: Dill. Hort. eltham. pl. 29, tab. 25, f. 28; Sturm, Deutschl. Fl. (1839) 72, 13.

Perennial; stems 30—60 cm long, prostrate at base and rooting; branches ascending, hairy all round, spiny (var. spinescens Ldb.) or unarmed (var. inermis Ldb.); leaflets 1—1.2 cm long, 0.5—0.8 cm broad, oval, obtusish, glandular-pubescent, the lower and sometimes the median 3-foliolate; stipules ovate, clasping; flowers short-pediceled, solitary in the

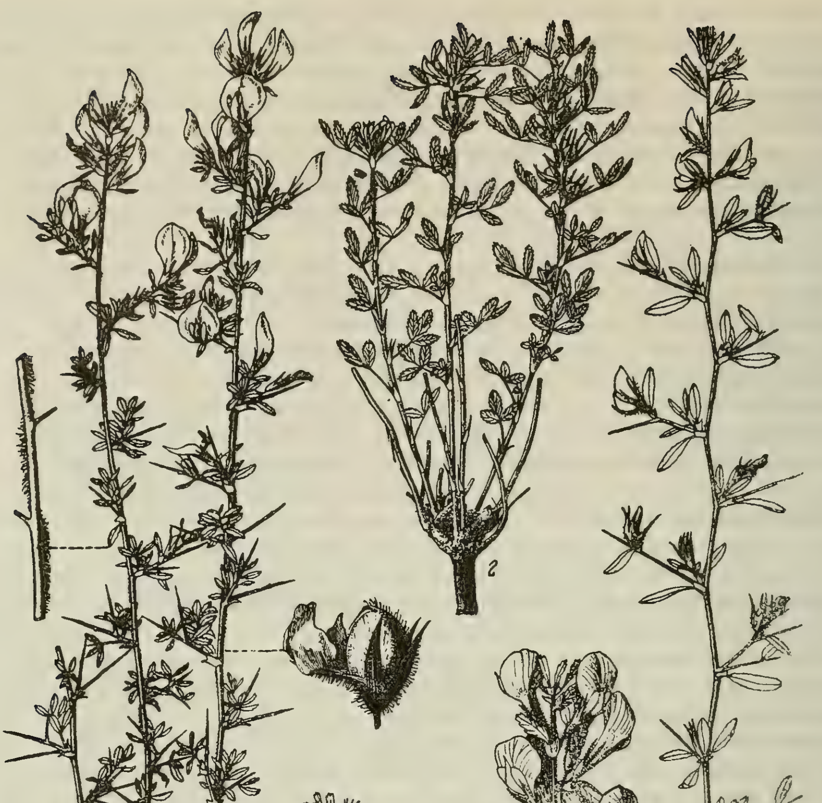

PLATE VII. 1 – Ononis spinosa L., portion of stem; pod with calyx; 2 – O. pusilla L.; 3 – O. arvensis L., portion of inflorescence; 4 – O. repens L., lower part of stem with branch; pod with calyx; 5 – O. antiquorum L., upper part of flowering stem; seed; 6 – O. leiosperma Boiss., seed.

axils of floral leaves, sometimes at ends of branches, forming a few-flowered raceme; calyx 8–12 mm long; standard ca. 15 mm long, otherwise corolla resembling that of O. arvensis L.; pod ca. 6 mm long, exceeded by calyx teeth. June–September. (Plate VII, Figure 4).

European part: Balt., U. Dns. Found by Kühlewein in 1843 as adventive in Leningrad Port. **Gen. distr.**: S. part of Scand., Centr., Atl. and S. Europe.

Note. Reports by Ledebour and certain other authorities concerning the occurrence of this species in the former Kherson Province are erroneous. The plant that does grow in this area, and was apparently mistaken for O. repens L., was probably O. arvensis L. (= O. hircina Jacq. var. subrepens Schmalh.) in which stem is ascending at base and the paired flowers are disposed in loose racemes.

4. **O. spinosa** L. Syst. Nat. ed. 10, II (1759) 1159; Ldb. Fl. Ross. I. 514; Shmal'g., Fl. I, 219; Grossg., Fl. Kavk. II, 254. – O. spinosa var. α L. Sp. pl. I (1753) 716, p. p. – O. spinosa β spinosa L. Sp. pl. II (1763) 1006, p. p. – O. campestris Koch et Ziz. Catal. Pl. Palat. (1814) 22. – Ic.: Sturm, Deutschl. Fl. (1839) 72, 11 (better illustration); Hallier, Fl. Deutschl., 23, I (1885) 133, tab. 2325.

Perennial; stems 30–60 cm long, erect or at base ascending, woody in lower part, with hairs in a line alternating from one internode to the next or in 2 lines; branches and branchlets spiny, the spines sometimes twin; leaflets 0.5–1 cm (rarely to 1.5 cm) long, 0.3–0.5 cm (rarely to 1 cm) broad, oblong to oblong-elliptic, subglandular-pubescent; stipules small, ovate to oblong-ovate, clasping; flowers short-pediceled, usually solitary in the axils of floral leaves, occasionally at ends of stem and branches and forming a few-flowered raceme; calyx 7–8 mm long; corolla twice as long as calyx; standard 15–17 mm long, otherwise corolla as in O. arvensis L.; mature pod ca. 7 mm long, asymmetrically ovoid, equaling or slightly exceeding the calyx teeth; seeds 2 or 3, minutely tuberculate. June–September. (Plate VII, Figure 1).

Plowfields and pastures, roadsides, and sandy riverbanks. – European part: Balt. (?) (Moon Island); U. Dnp. (Vladimir-Volynsk and Turiisk, according to Paczoski). **Gen. distr.**: S. Scand., Centr. Eur. Described from Central Europe. Type in London?

Note. Spiny specimens of O. arvensis L. (= O. hircina Jacq. var. spinescens Ldb.) are often mistakenly identified as O. spinosa L. It should be noted that O. spinosa is a West European species and occurs in such adjoining countries as parts of what used to be Polish territory. In the USSR, even though reported by some authorities for the Caucasus and Crimea, it has in fact only been collected by Paczoski in the vicinity of Vladimir-Volynsk and Turiisk. This species differs clearly from spinescent forms of O. arvensis L. in a number of characters: its flowers are borne singly in the leaf axils and do not form dense spikelike inflorescences; the mature pod equals or slightly exceeds the calyx, the stem is mostly pubescent in a single line, and the leaves are smaller.

5. **O. antiquorum** L. Sp. pl. II (1763) 1006; Boiss. Fl. Or. II (1872) 57; Asch. et Gr. VI, 2, 353; Hayek, Pr. Fl. Balc. (1927) 829; Grossg., Fl. Kavk. II, 254. – O. diacantha Sieb. ex Rchb. Ic. Crit. I, tab. 15, Ic.: Sturm, Deutschl. Fl. (1839) 72, 12; Rchb. Ic. Crit. I (1823) tab. VII, f. 14 et 15; Rchb. Ic. Fl. Germ. XXII, tab. MMXCVIII, f. I (1903). –Exs.: Orphanides, Fl. Graeca No. 569.

Shrub; stems 50–80 cm, rarely to 1m long, puberulent all round or subglabrous, branched, sometimes markedly flexuous, with numerous and sometimes twin spines; leaves glandular-pubescent, short-stipuled, minutely stipulate, mostly simple, only the lower ones 3-foliolate; leaflets 0.5–1.5 cm long and 0.2–0.5 cm broad, varying in shape from oblong or oval to obovate, subtruncate at apex; flowers 7–10 mm long, solitary in the axils of floral leaves on lateral branches and branchlets transformed into spines, or in small groups at their base, or rarely at the ends of branches forming few-flowered racemes; calyx 7–8 mm long, with only glandular or simple as well as glandular hairs; corolla slightly exceeding to one-third as long again as calyx; standard 9–10 mm long, broad-oval or suborbicular; wings and keel about equaling standard; pod 5–6 mm long, asymmetrically ovoid, slightly exceeded by calyx teeth; seeds 1 or 2, minutely tuberculate. June– 101 August. (Plate VII, Figure 5).

Slopes of ravines, on wet clayey soil, sometimes on gravel, banks of irrigation ditches and rivulets, borders of ricefields, sometimes roadsides. – European part: Crim. (Kerch Peninsula); Caucasus (rare): W., E., and S. Transc.; Centr. Asia: Ar.-Casp., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. **Gen. distr.**: S. part of Centr. Eur. (to Germany), As. Min. Described from Asia Minor. Type in London.

Note. A polymorphic species, displaying variability in respect to leaf shape, indument, flower proportions, and spine characteristics. It forms a range of hybrids with O. arvensis L., these gravitating to a varying degree toward one or the other of the parental species. The flowers of the hybrids are of intermediate size, solitary or paired; when leaves are large as in O. arvensis L., spikelike inflorescences do not occur and the stems are glabrous or puberulent (Crim., S. Transc., T. Sh., surroundings of Frunze).

Economic importance. In antiquity, about the time of Theophrastus and Dioscorides, the roots of this plant were used as a mild diuretic (according to Tschirch).

6. **O. leiosperma** Boiss., Fl. Or. II (1872) 57; Shmal'g., Fl. I, 220; Grossg., Fl. Kavk. II, 254.

Perennial; differing little from the preceding; calyx and stem covered throughout with long white hairs (β tomentosa Boiss.); leaves densely glandular-pubescent; flowers paired or solitary; seeds smooth, naked. June–September. (Plate VII, Figure 6).

Slopes and sandy seashores. – European part: Crim.; Caucasus: (according to Grossheim: Azerbaijan, Armenia). **Gen. distr.**: Balkan Peninsula (Macedonia, Thessaly – according to Hayek), As. Min. and S. Iran. Described from Asia Minor. Type in Geneva.

Note. The distinctiveness of this species is doubtful. It is clear from Boissier's diagnosis that it differs from O. antiquorum L. only in the smooth seed surface. Among our smooth-seeded Crimean plants, the flowers are mostly paired and this is in contradiction to Boissier's diagnosis which records solitary flowers for O. leiosperma. Moreover, in a specimen of O. antiquorum L. from Azerbaijan (No. 439), identified under this name by Boissier himself, the seeds have been found to be quite smooth.

7. **O. intermedia** C. A. M. ex Becker in Bull. Soc. Nat. Mosc. XXXI (1858) 28 (nomen); Rouy et Foucaud, Fl. Franc. IV (1897) 271 (descriptio). O. repens ssp. intermedia (C. A. M.) Asch. et Gr. Syn. Mitteleur. Fl. VI, 2 (1906–1910) 350. – O. hircina Jacq. var. intermedia Širj. Gen. Ononis Revis. crit. (1932) 568.

Perennial; stems 60–80 cm long, with pubescence in a line alternating from one internode to the next, rarely pubescent all round or glabrate; spines few, mostly on lateral branches, rarely stems unarmed; leaves 2 sometimes glaucescent; leaflets ca. 1 cm (rarely to 1.5 cm) long, 0.5 cm broad, oblong or elliptic, denticulate, glandular-pubescent; stipules broad, clasping, dentate; flowers 10–13 mm long, paired or rarely solitary in the axils of floral leaves, forming rather dense spikelike inflorescences at ends of stems and branches; calyx 7–10 mm long; corolla slightly exceeding to at most one-third as long again as calyx; standard 10–13 mm (rarely to 15 mm) long, oval; wings and keel slightly shorter than standard; pod broad-ovoid, asymmetrical, ca. 7 mm long, equaling or slightly exceeded by calyx; seeds 2, minutely tuberculate. June–August.

Riverbanks and scrub, on wet solonetzic soil. – European part: M. Dnp., Bl., L. Don, L. V., Transv.; Caucasus: Cisc., Dag.? E. Transc.? **Gen. distr.**: little studied outside the USSR; reported for Corsica, Istria, Italy, (Spain?). Described from the banks of the Sarpa River (Fl. Sareptana). Cotype in Leningrad.

Genus 789. **TRIGONELLA** * L. (em.)**

L. Gen. pl. ed. 5 (1754) 338.

Corolla yellow, blue, or violet; petals glabrous, caducous, distinct, or wings interlocking with keel by a projection; dorsal stamen free; ovary sessile; stigma very small; pod cylindric, sometimes compressed, mostly linear, or flat, elliptic, oblong, or lunate, more or less leathery, 1–many-seeded, usually distinctly and often conspicuously beaked. Annuals or perennials, with 3-foliolate leaves; flowers usually in axillary umbels or racemes, rarely solitary. Russian name: pazhitnik.

Type species T. foenum graecum L.

Economic importance. Minor species of the genus Trigonella are of some value as components of ephemeral vegetation in winter pastures, since they sometimes develop in great quantity. The same species occur commonly as weeds in plowfields and more particularly in fallows, but they cannot be considered as noxious weeds. Most species contain coumarin. T. coerulea is grown in various parts of Europe where it is used for flavoring green cheese. T. foenum graecum L. is cultivated in the Orient as a condiment and more rarely as forage.

1. Pod cylindric, sometimes more or less compressed, mostly linear . . . . 2.
+ Pod flat, elliptic, oblong or lunate . . . . 22.
2. Calyx tubular, (4) 6–12 mm long, covered with long hairs . . . . 3.

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* From trigonum – triangle.

** Treatment by A.A.Grossheim.

+ Calyx campanulate, 2–5 mm long, glabrous or short-hairy . . . . . . 5.

103 3. Flowers in a many-flowered capitate long-peduncled raceme; pod including beak 15–20 mm long . . . . 20. **T. coerulescens** (M. B.) Halaczy.

+ Flowers solitary or paired in the leaf axils, sessile; pod much longer . . . . 4.

4. Pod, including beak, 3–5 cm long, compressed . . . . 21. **T. gladiata** Stev.

+ Pod, including beak, 8–12 cm long, terete. . . . . .* **T. foenum graecum** L.

5. Flowers blue, small, in dense capitate peduncled racemes; pod erect, terete, 3–6 mm long . . . . 6.

+ Flowers yellow or pale yellow, rarely faintly bluish . . . . 8.

6. Pod 3 mm long, 1-seeded; corolla 4–4.5 mm long. S. Transc. . . . . 19. **T. capitata** Boiss.

+ Pod 4.5 mm long, 1- or 2-seeded; corolla 5–6 mm long . . . . 7.

7. Raceme remaining dense and not elongating in fruit; pod abruptly beaked, finely veined . . . . 17. **T. coerulea** (Desr.) Ser.

+ Raceme elongating and becoming loose in fruit; pod gradually tapering to beak, prominently veined . . . . 18. **T. procumbens** (Bess.) Rchb.

8. Pod on recurved stipe, pendent . . . . 9.

+ Pod on erect stipe . . . . 12.

9. Pod cylindric, 13–20 mm long, arching or straight, the dorsal suture not prominent . . . . 10.

+ Pod ovoid-cylindric, falcate, with beak the length of body, the dorsal suture prominent . . . . 11.

10. Pod conspicuously contracted between the seeds . . . . 5. **T. strangulata** Boiss.

+ Pod not contracted between the seeds. . . . . 4. **T. torulosa** Griseb.

11. Pod, excluding beak, 10–20 mm long; inflorescence loosely few-flowered . . . . 6. **T. calliceras** Fisch. et Mey.

+ Pod, excluding beak, ca. 5 mm long; inflorescence densely many-flowered . . . . 7. **T. spicata** Sibth. et Sm.

12. Corolla 13–14 mm long, yellow; pod slenderly cylindric, straight, 3–5 (7) cm long . . . . 3. **T. grandiflora** Bge.

+ Corolla to 6–7 mm long . . . . 13.

13. Wings not interlocking; reticulation of pod surface narrowly fusiform, much elongated longitudinally . . . . 14.

104 + Wings interlocking by a projection fitting into a notch of the keel; reticulation of pod surface square or rectangular, little elongated, always with distinct cross-partitions . . . . 15.

14. Pod 6–8 cm long . . . . 2. **T. turkmena** M. Pop.

+ Pod 2–3 (4) cm long . . . . 1. **T. verae** Sir.

15. Inflorescence on peduncles exceeding the subtending leaf . . . . 16.

+ Inflorescence sessile or flowers solitary or paired in the leaf . . . . axils . . . . 18.

16. Pods 3 or 4, mostly strongly arching; inflorescence umbellate . . . . 6. **T. tenuis** Fisch.

+ Pod slightly arching or almost straight . . . . 17.

17. Inflorescence umbellate; pods stellately spreading, markedly attenuate toward tip, almost pointed; corolla 4 mm long . . . . 11. **T. astroides** Fisch.

+ Inflorescence racemose; pods not stellate, scarcely attenuate toward tip; corolla 5–7 mm long . . . . 10. **T. fischeriana** Ser.

18. Pods on recurved stipes, 4–14 in inflorescence, stellately spreading, 7–15 mm long . . . . 16. **T. monspeliaca** L.

+ Pods on straight stipes, not stellately spreading, usually not more than 8 . . . . 19.

19. Corolla 4–5 mm long; pods 15–50 mm long . . . . 20.

+ Corolla 6–7 mm long; pods (4) 5–8 cm long . . . . 21.

20. Pods strongly arching, 15–20 mm long . . . . 9. **T. arcuata** C. A. M.

+ Pods straight or strongly curved, 2–3 cm long . . . . 15. **T. orthoceras** Kar. et Kir.

21. Flowers mostly solitary; reticulation of pod very narrow and elongated; leaflets often deeply incised . . . . . 12. **T. monantha** C. A. M.

+ Flowers mostly in pairs; reticulation of pod broader, oblong; leaflets sometimes incised . . . . 13. **T. noëana** Boiss.

++ Lower flowers solitary, the upper paired; reticulation almost isodiametric; leaflets not incised . . . . 14. **T. geminiflora** Bge.

22. Pods more or less glandular-pubescent, lunate . . . . 23.

+ Pods eglandular, commonly glabrous . . . . 24.

23. Pods numerous, 4–6 mm long, 3–5 mm broad . . . . 24. **T. brachycarpa** (Fisch.) Moris.

+ Pods solitary, 15–22 mm long, 8–10 mm broad . . . . 25. **T. biflora** Griseb.

24. Pod 15–20 mm long, strongly curved, almost through a full circle, the margin toothed . . . . 23. **T. radiata** (L.) Boiss.

+ Pod less strongly curved . . . . 25.

25. Corolla rose, later browning, persistent and enveloping the fruit; pod 2-seeded, 8–9 mm long . . . . 35. **T. gordejevi** (Kom.) Grossh.

+ Corolla not rose, caducous . . . . 26.

26. Pod lunate-elliptic, 5–6 mm long, 4–5 mm broad, with prominent radial veins . . . . 22. **T. cretacea** (M. B.) Grossh.

+ Pod elliptic, not more than twice as long as broad . . . . 27.

++ Pod oblong, three to four times as long as broad . . . . 28.

27. Pod 18–22 mm long; corolla mauve . . . . 33. **T. platycarpos** L.

+ Pod 6–8 mm long; corolla reddening toward end of flowering . . . . 34. **T. popovii** E. Kor.

28. Pod 13–22 mm long . . . . 29.

+ Pod 8–12 mm long . . . . 32.

29. Pod 11–13 (15) mm long, 3–4 mm broad . . . . . 26. **T. pamirica** Boriss.

+ Pod 15–25 mm long . . . . 30.

30. Oblique veins on pod surface arising at an angle from both sutures, branching and anastomosing at center; pod 15–18 mm long, 3–5 mm broad . . . . 27. **T. badachschanica** Aphan.

+ Oblique veins parallel and uninterruptedly traversing the pod surface . . . . 31.

31. Racemes loose, the flowers up to 5–6 mm apart; corolla 8–9 mm long; pod 20–25 mm long, ca. 5 mm broad . . . . 29. **T. laxiflora** Aitch. et Bak.
+ Racemes dense; corolla 9–10 mm long; pod 14–20 mm long, 5–7 mm broad . . . . 28. **T. lipskyi** Šir.
32. Leaflets oblong-oblanceolate or oblong-linear . . . . . 31. **T. ruthenica** L.
+ Leaflets obovate . . . . 33.
33. Plants of Central Asia; corolla 8 (10) mm long; stems 20–40 cm long . . . . 30. **T. adscendens** Aph. et Gontsch.
106 + Plants of the Far East; corolla 5–6 mm long; stems 40–60 cm long . . . . 32. **T. korshinskyi** Grossh.

Subgenus 1. **EUTRIGONELLA** Grossh. — Pod cylindric or sometimes more or less compressed, but not flat, commonly linear, rarely lanceolate or oval, 1-seeded, mostly conspicuously beaked.

Section 1. **VERAE** Širjaev, Gen. Trig. rev. crit. II (1929) 14. — Wings not toothed; flowers yellow, racemed or sessile; calyx campanulate or subtubular; pod linear to cylindric, often subarcuately curved at tip; veins predominantly longitudinal, forming a very narrow fusiform network.

1. **T. verae** Širjaev, in Fedde Repert. XXIV (1928) 208. — Ic.: Širjaev, Gen. Trig. rev. cr. II (1929) tab. IV, f. 45 and tab. V, f. 13; Fl. Tadzhik. V (1937) tab. 8, p. 5.

Annual; stems prostrate or erect, 10–15 cm long, appressed-hairy; stipules very small, denticulate; leaflets obovate-cuneate, dentate, 4–5 mm long and 4 mm broad; flowers solitary; pedicels 2 mm long; calyx shorter than corolla, the triangular teeth shorter than tube; corolla yellow, 5 mm long; standard oblong, retuse; pod straight or slightly curved, linear, terete, 20–30 mm long, 1–1.5 mm in diameter, slightly hooked at tip, minutely beaked, the oblique veins forming an elongate-oblong network; seeds oblong, yellow, red-dotted. May–June. (Plate VIII, Figure 1).

Dry slopes in the lower mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Shkhirtob in the Zeravshan Valley. Type in Leningrad.

2. **T. turkmena** M. Popov in Not. Syst. Inst. Bot. Ac. Sc., VII, f. 1 (1937) 17.

Annual; stem branched, 20–25 cm long; stipules triangular-subulate, very small, entire or with a basal tooth; leaflets broadly obovate, 5–7 mm long, dentate; flowers solitary in the leaf axils, short-pediceled; bracts equaling calyx, indurated in fruit, 2–4 mm long; calyx 2 mm long, the triangular-subulate teeth shorter than the tube; corolla light yellow, two and a half times as long as calyx; pod terete, 6–8 cm long, 1.5–2 mm broad, hooked at tip, slightly contracted between seeds, the veins stretching longitudinally and forming a narrow fusiform network; seeds cylindric, 2 mm long, 1 mm broad, very finely tuberculate. May.

Dry hills in the foothill zone. — Centr. Asia: Mtn. Turkm. (Karakala). Endemic. Described from Karakala. Type in Leningrad.

3. **T.grandiflora** Bge. Reliq. Lehman. in Naturf. Ver. Riga I (1847) 104; Boiss. Fl. or. II, 73. — Ic.: Širjaev, Gen. Trig. rev. cr. II (1929) tab. IV, f. 43 et tab. V, f. 1–6; Fl. Tadzhik. V, tab. 7 and 8. Exs.: H. F. A. M. No. 282.

Annual, glabrate; stems branched from base or unbranched, mostly erect, 5–20 (40) cm long; stipules very small, semisagittate, toothed at base; leaflets obovate-subulate, sharply dentate toward apex, 10–15 mm long and 5–10 mm broad; pedicels shorter than subtending leaf; inflorescence umbelliform, 2–3 (5)-flowered; pedicels ca. 2 mm long; calyx one-fifth to half as long as corolla, subtubular, with acute triangular teeth; corolla yellow, 13–14 mm long; standard obovate-oblong; pod 3–5 (7) cm long and 1–2 mm broad, terete, almost straight or curved, with obliquely transverse anastomosing veins forming a narrowly oblong network, the beak short; seeds 3 mm long, yellow, diffusely red-dotted. April–June. (Plate VIII, Figure 3).

Dry stony and gravelly slopes, semideserts, cultivated fields and fallow in the lower mountain zone, rarely rising into the middle mountain zone to 900 m. — European part: L. V., V.-Don (Saratov); Centr. Asia: Mtn. Turkm., Amu D., Pam.-Al., Syr D. **Gen. distr.**: Iran. Described from Bakali between the Kyzyl-Kum Desert and the Yak-Darya, also along the Kuvan-Darya. Type in Leningrad.

Section 2. CYLINDRICAE Boiss. Fl. or II (1872) 66. — Stipules entire; racemes rather dense, pedunculate; fruiting pedicels recurved; wings without attachment teeth; corolla yellow, rarely white or bluish; pod cylindric, curved, tapering to a beak, longitudinally veined; seed smooth.

Subsection 1. BOISSIERIANAE Širjaev, Gen. Trig. Rev. crit. II (1929) 22. — Pods without constrictions between seeds.

4. **T.torulosa** Griseb. Spicil. fl. Rum. I (1843) 40. — T. spruneriana Boiss., Diagn pl. nov. ser. 1, 2 (1843) 17; Ej. Fl. or., II, 80; Grossg., Fl. Kavk. II (1930) 257. — Ic.: Širjaev, Gen. Trig. rev. cr. II (1929) tab. IV, f. 46, 47 and tab. V, f. 14, 15. — Exs.: Pl. or. exs. No. 13. —

Annual; stems ascending, rarely erect, branched, (5) 10–25 cm long; stipules lance-subulate, toothless; leaflets obovate-cuneate, dentate, 7–10 mm long, 4–7 mm broad; peduncle equaling subtending leaf, elongating in fruit; inflorescence rather dense, 5–10-flowered, subcapitate; pedicels to 2 mm long, recurved in fruit; calyx half as long as corolla, with unequal teeth, the longest as long as the tube; corolla pale yellow, 5–6 (7) mm long, rarely 4–4.5 mm (f. transcaspica Šir.); standard obovate-oblong, slightly retuse; pod terete, ca. 2 cm long and ca. 2 mm in diameter, falcate, tapering to a short curved beak, densely puberulent, obscurely netted-veined; seeds ca. 2 mm long, smooth. May. (Plate VIII, Figure 4).

Dry stony slopes in the lower mountain zone. — Caucasus: E. and S. Transc.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: E. Med., Bal.-As. Min. (Asia Minor), Arm.-Kurd., Iran., Mesopotamia. Described from Modurlu in Bithynia.

Subsection 2. STRANGULATAE Širjaev, Gen. Trigonella rev. crit., II (1929) 35. — Pod distinctly constricted between seeds.

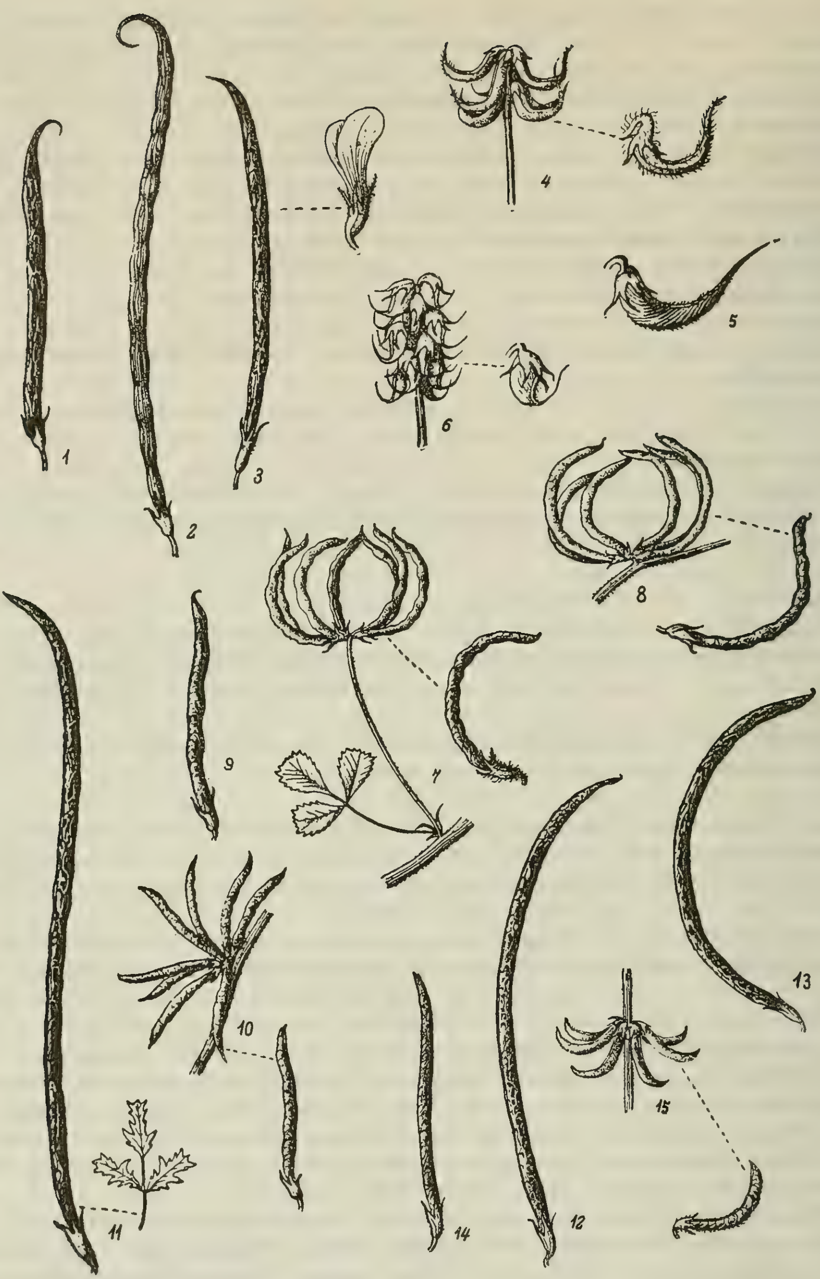

PLATE VIII. 1 – Trigonella verae Šir.; 2 – T.turkmena M.Pop.; 3 – T.grandiflora Bge.; 4 – T.torulosa Griseb.; 5 – T.calliceras Fisch.et Mey.; 6 – T.spicata Sibth. et Sm.; 7 – T.tenuis Fisch.; 8 – T.arcuata C.A.M.; 9 – T.fischeriana Ser.; 10, 14 – T.astroides Fisch.; 11 – T.monantha C.A.M.; 12 – T.noëana Boiss.; 13 – T.geminiflora Bge.; 15 – T.monspeliaca L.

5. **T. strangulata** Boiss. Diagn. pl. nov. ser. 1, 9 (1849) 17; Boiss. Fl. or. II (1872) 79; Širjaev, Gen. Trig. rev. cr. II (1929) 36. — Ic.: Širjaev, l. c., tab. V, f. 31.

Annual; stems commonly erect, moderately branched, 10—20 cm long; stipules triangular-cuneate, retuse or rounded at apex, denticulate, glabrate, 7—12 mm long and 6—8 mm broad; peduncle one and a half times to twice length of subtending leaf; racemes loose, 5—10-flowered; pedicels 1—1.5 mm long; calyx ca. 4 mm long, half length of corolla, the triangular-lanceolate teeth shorter than the tube; corolla 5—6 mm long, yellow; pod (2) 3- or 4-seeded, 13—15 (18) mm long, ca. 3 mm in diameter, pendent, terete, straight or slightly curved, appressed-puberulent, conspicuously contracted between seeds, the slightly curved beak 5—8 mm long. April—June.

Dry stony slopes in the middle mountain zone. — Caucasus: S. Transc. (Megry, Megrykh Kala-dash). **Gen. distr.:** Bal.-As. Min. (Asia Minor), Arm.-Kurd., Iran. Described from Modurlu in Bithynia. Type in Geneva.

Note. I have not seen the authentic specimens of T. strangulata. Our plants deviate from the diagnoses of Boissier and Shiryaev in having a longer and more curved beak.

Section 3. CALLICERATES Boiss. Fl. or. II (1872) 67. — Stipules toothed; flowers in a capitate-umbellate raceme; pedicels recurved after flowering; corolla yellow; wings without an attachment tooth; pod short-cylindric, prolonged into a long beak, densely obliquely transverse-nerved; seeds thin, tuberculate.

6. **T. calliceras** Fisch. in M. B. Fl. taur.-cauc. III (1819) 515; Ldb. Fl. Ross. I, 531; Boiss. Fl. or. II, 86; Grossg., Fl. Kavk. II, 256; Širjaev, Gen. Trig. rev. crit. II (1930) 3. — T. ornithorhynchus Fisch. ex Hornem. Hort. Hafn. Suppl. (1819) 85. — Exs.: Herb. Fl. Cauc. No. 178.

Annual; stems ascending, rarely erect, 10—35 cm long, sparingly short-hairy; stipules very small, semisagittate, toothed at base; leaflets broadly obovate-cuneate, denticulate, obtuse or rarely retuse, glabrate, (4) 8—13 mm long, 4—8 mm broad; peduncle equaling subtending leaf, finally elongating to 3 cm; umbel loosely 3—5 (8)-flowered; pedicels ca. 1—1.5 mm long; calyx 3 mm long, pubescent, half as long as corolla, the triangular-linear teeth as long as tube; corolla bright yellow, ca. 6 mm long; standard ovate, broadly emarginate; pods spreading, cylindric, falcate, 1—2 cm long, puberulent, with numerous thick parallel spirally coiled veins; beak 1—2 cm long, about the length of the pod, slender, bending away from the pod curvature; seeds yellowish, ovoid. April—May. (Plate VIII, Figure 5).

Stony places, taluses, gravel, scrub, weed-infested places, rarely cultivated fields in the lower mountain zone. — Caucasus: Cisc., E. Transc., Tal. **Gen. distr.:** Iran (part adjacent to the Caspian). Described from Tbilisi. Type in Leningrad.

Section 4. UNCINATAE Boiss. Fl. or. II (1872) 67, pro §. — Stipules entire, rarely 1-toothed; inflorescence long-peduncled, subcapitate, dense; pedicels recurved after flowering; corolla yellow; wings without interlocking projection; pod small, compressed-ovoid, reticulate; beak uncinate; seeds finely tuberculate.

7. **T. spicata** Sibth. et Sm. Prodr. Fl. Graec. II (1813) 108; Boiss. Fl. or. II, 86; Shmal'g., Fl. I, 222; Grossg., Fl. Kavk. II, 257. — Trifolium hamosum M. B. Fl. taur.-cauc. II (1808) 907, 1200, non Trigonella hamosa L. — Melilotus uncinata Bess. ex Ldb. Fl. Ross. I, 555. — Ic.: Sibth. et Sm., Fl. graeca, VIII, tab. 763; Širjaev, Gen. Trig. rev. cr. III (1930) tab. VII, f. 69 and tab. VIII, f. 21, 22.

Annual; stems ascending, often erect, branched, glabrous, 10—30 (40) cm long; branches erect; stipules lance-linear to semisagittate, the lower with or without a basal tooth; leaflets obovate to obovate-oblong, those of upper leaves to linear-elliptic, dentate; peduncle 2—3 cm long, exceeding the subtending leaf, elongating in fruit; inflorescence capitate, densely 10—25-flowered, ovoid-oblong, 10—15 mm long; pedicels ca. 2 mm long, recurved in fruit; calyx slightly shorter than corolla, unequally toothed, the longest tooth as long as the tube; corolla 6—7 mm long, pale yellow; standard ovate-oblong, slightly retuse; pod 1-seeded, ca. 5 mm long and 3 mm broad, ovoid, at first covered with rather long hairs, later glabrescent, reticulate, 112 abruptly beaked, the beak as long as the pod, uncinately upcurved; seeds ca. 2.5 mm long, ovoid, finely tuberculate. May—June. (Plate VIII, Figure 6).

Dry slopes, open scrub, borders, fallows, rarely cultivated fields in the lower mountain zone. — European part: Crim.; Caucasus: Dag., E. and S. Transc. **Gen. distr.**: E. Med., Arm.-Kurd. Described from S. Crimea and Georgia. Type in Leningrad.

Note. The name given by Marshall Bieberstein, even though earlier, cannot be used, since the description referred to Trigonella hamosa L. from Egypt.

Section 5. **BUCERATES** Boiss. Fl. or. II (1872) 65. — Stipules of lower leaves sometimes toothed, mostly entire; flowers sessile or in a peduncled umbel; corolla yellow; wings with interlocking projection; pod linear, straight or curved, longitudinally or transversely nerved; seeds cylindric, finely tuberculate.

8. **T. tenuis** Fisch. in M. B. Fl. taur.-cauc. III (1819) 514; Ldb. Fl. Ross. I, 532. — ? T. striata L. fil. Suppl. (1781) 340. — T. striata Ldb. Fl. Ross. I (1842) 532, p. p.; Boiss. Fl. or. II, 71; Shmal'g., Fl. I, 22; Grossg., Fl. Kavk. II, 258; Širjaev, Gen. Trig. rev. cr. III (1930) 14. — Medicago cancellata Kryl., Fl. Zap. Sib. VII (1933) 1587. — Ic.: Širjaev, l. c., III, tab. VII, f. 73, tab. VIII, f. 11 (1930).

Annual; stems commonly branched from base, often procumbent, rarely erect, (5) 15—40 mm long, sparingly short-hairy; stipules very small, semisagittate; leaflets obovate or elliptic, sharp-dentate, 5—8 mm long and 4—6 mm broad; peduncle slender, 1.5—3 cm long, exceeding subtending leaf; inflorescence umbelliform, (1) 2—3 (4)-flowered; bracteoles linear-subulate; calyx shorter than corolla, the lance-subulate teeth slightly longer than the tube; corolla yellow, 4—5 mm long; standard obovate-oblong; pod 20—25 mm long, arched-recurved, rarely suberect, linear, transversely reticulate, the beak very short; seed to 2 mm long, tuberculate-rugose. May—June. (Plate VIII, Figure 7).

Dry stony and gravelly slopes, pebbles, river valleys, fallows, and cultivated fields in the middle mountain zone. — European part: L. V, Crim;

Caucasus: Dag., E. and S. Transc., Tal.; W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Syr D., T. Sh., Balkh., Amu D. **Gen. distr.**: Bal.-As. Min. Described from Kodzhori near Tbilisi. Type in Leningrad.

Note. T. striata was described by Linné (the son) from Abyssinia, whence the genus Trigonella has not since been reported. Without exploring Linné's original herbarium, it is impossible to determine what his T. striata actually represents. We have therefore passed on to the chronologically succeeding appellation that refers to specimens fully identified and accessible to study. As regards Buceras torosa Moench, 3 Suppl. (1802) 51, this is simply a synonym of T. striata L. fil., with a brief repetition of Linné's diagnosis and without reference to any specimens; this name is therefore likewise unacceptable.

9. **T. arcuata** C. A. M. Verzeichn. Cauc. (1831) 136; Ldb. Fl. Ross. I, 533; Boiss. Fl. or. II, 74; Shmal'g., Fl. I, 223; Grossg., Fl. Kavk. II (1930) 259. — T. cancellata var. b. arcuata Širjaev Gen. Trig. rev. cr. III (1930) 17. — Ic.: Širjaev, l. c., (1930) tab. VII, f. 72, tab. VIII, f. 4, 6, 7; Fl. Tadzhik. v (1937). t. 8, p. 3.

Annual; stems branched from base, commonly procumbent, rarely erect, (5) 15—40 cm long, sparingly short-hairy; stipules very small, semisagittate; leaflets triangular-obovate, sharp-dentate, 5—8 mm long and 5—6 mm broad; inflorescences sessile or borne on a very short peduncle, umbelliform, 4- or 5 (8)-flowered; bracts linear-subulate; calyx slightly shorter than corolla, the subulate teeth longer than tube; corolla yellow, 4—5 mm long; standard obovate-oblong; pod 15—20 mm long, strongly arched-recurved, linear, transversely reticulate, short-beaked; seeds to 2 mm long, tuberculate-rugose. May—June. (Plate VIII, Figure 8).

Among semidesert vegetation, dry stony mountain slopes, fallows, and cultivated fields in the lower or rarely the middle mountain zone. — European part: L. V.; Caucasus: Cisc., Dag., E. and S. Transc., Tal.; W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kara K., Amu D., Syr D. **Gen. distr.**: Arm.-Kurd., Iran. Described from Zuvand in Talysh. Type in Leningrad.

10. **T. fischeriana** Ser. in DC. Prodr. II (1825) 183; Ldb. Fl. Ross. I, 532; Boiss. Fl. or. II, 73; Shmal'g., Fl. I, 223; Grossg., Fl. Kavk. II, 258. — T. flexuosa Fisch. in M. B. Fl. taur.-cauc. III (1819) 515, non Del. — Ic.: Širjaev, Gen. Trig. rev. cr. III (1930) tab. VII, f. 68, 75, 79, tab. VIII, f. 10.

Annual; stems branched from base, weak, ascending, 15—30 (40) cm long, subappressed-hairy; stipules semisagittate, subulate-tipped; leaflets obovate-subulate to ovate-rhombic, 3—7 mm long and 3—6 mm broad, dentate at summit; peduncle 2—3 cm long, about twice length of subtending leaf; inflorescence loosely capitate, 4—10-flowered; bracts subulate; pedicels ca. 1 mm long; calyx one-third to half as long as corolla, tubular, the teeth as long as the tube; corolla bright yellow, 5—7 mm long; standard oblong, retuse; keel as long as wings; pod straight to slightly flexuous and curved, narrowly linear, 1.5—2.5 cm long, transversely reticulate-veined; seeds oblong-cylindric, tuberculate, 2 mm long. May—June. (Plate VIII, Figure 9).

Scrub and wood margins, gravelly places, in the lower and middle mountain zones. — European part: L. V., Crim.; Caucasus: E. and S. Transc. **Gen. distr.**: Bal.-As. Min. (Asia Minor), Mesopotamia. Described from Tbilisi. Type (or cotype) in Leningrad.

11. **T. astroides** Fisch. et Mey. in Ind. Sem. H. Petrop. I (1835) 40; Ldb. Fl. Ross. I, 532; Boiss. Fl. or. II, 72; Grossg., Fl. Kavk. II, 258; Širjaev, Gen. Trig. rev. crit. III (1930) 26.

Annual; stems ascending, 5–10 cm long, sparingly covered with rather short hairs; stipules very small, 2- or 3-toothed at base; leaflets 4–6 mm long and 3–5 mm broad, obcordate-cuneate, denticulate, glabrate; peduncle equaling the subtending leaf, ca. 1 cm long; inflorescence umbelliform, 6–10-flowered; pedicels very short; calyx campanulate, half as long as corolla, the subulate-lanceolate teeth as long as tube; corolla pale yellow, ca. 4 mm long; pod stellately spreading, linear, straight or very slightly curved, to 2 cm long, slightly compressed, attenuate to a point, densely cross-rugose; seeds oblong, brownish, tuberculate. May–June. (Plate VIII, Figures 10, 14).

Dry, finely gravelly slopes and gravels in dry stream beds. – Caucasus: E. Transc. (along the Incha-chai River). **Gen. distr.:** E. Med., Bal.-As. Min. (Asia Minor), Iran. Described from eastern Karabakh (Incha-chai). Type in Leningrad.

12. **T. monantha** C. A. M. Verzeichn. Cauc. (1831) 137; Ldb. Fl. Ross. I, 534; Boiss. Fl. Or. II, 77; Grossg., Fl. Kavk. II (1930) 259. – Ic.: Širjaev, Gen. Trig. rev. cr., IV (1931) tab. IX, f. 84 et tab. X, f. 10, 14.

Biennial; stems ascending, branched from base, 5–20 (30) cm long, sparingly appressed-hairy; stipules semisagittate, toothed at base; leaflets obovate to elliptic, sharp-dentate or mostly incised to almost dissected, 5–10 mm long and 4–5 mm broad; flowers solitary, rarely paired, sessile, rarely minutely pediceled; bracteoles subulate; calyx shorter than corolla, the subulate teeth as long as tube; corolla 7–8 mm long, pale yellow; standar obovate, much longer than both wings and keel; pod linear, 6–7 (8) cm long, almost straight or mostly subuncinately curved at tip, with elongated reticulation, the beak very short; seeds small, transversely tuberculate. May–June. (Plate VIII, Figure 11).

Dry stony slopes, fallows, and plowfields in the lower and middle mountain zones. – Caucasus: E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** E. Med., (Syria, Palestine), Bal.-As. Min. (Asia Minor), Arm.-Kurd., Iran. Described from Zuvand in Talysh. Type in Leningrad.

115 13. **T. noëana** Boiss. Diagn. pl. nov., sér. 2, II (1856) 11; Ej. Fl. or. II, 77; Grossg., Fl. Kavk. II, 259. – Ic.: Širjaev, Gen. Trig. rev. cr. VI (1931) tab. IX, f. 83 and tab. X, f. 6, 9. – II. Hoe.

Annual, closely resembling T. monantha, glabrate throughout; stipules semisagittate, toothed at base; leaflets acutely ovate-cuneate, dentate, not normally incised or dissected, 5–10 mm long and 3–5 mm broad; flowers commonly paired, sometimes in threes, rarely solitary, sessile; bracts subulate; calyx slightly shorter than corolla, the linear teeth as long as tube; corolla pale yellow, 6–7 mm long; standard obovate; pod linear, subglabrous, 5–7 cm long, usually slightly arching, the reticulation broader than in the case of T. monantha. May–June. (Plate VIII, Figure 12).

Dry stony, gravelly, or sandy places, fallows and cultivated fields in the lower and middle mountain zones. – Caucasus: S. Transc., Tal.; Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al. Described from Cuth in Babylonia. Type in Geneva.

14. **T. geminiflora** Bge. Reliq. Lehm. (1847) 105. — T. incisa var. geminiflora Boiss. Fl. Or. II (1872) 76. — Ic.: Širjaev, Gen. Trig. rev. crit. IV (1931) tab. IX, f. 92, tab. X, f. 11; Fl. Tadzhik. V, Plate 8, Fig. 2.

Annual, resembling T. noëana; glabrate throughout; stipules semisagittate, toothed at base; leaflets obovate-cuneate, the lateral usually obtriangular, never dissected or deeply incised, 5–10 mm long and 3–5 mm broad; lower flowers always solitary, the upper paired, axillary; bracteoles subulate; calyx slightly shorter than corolla, the linear teeth as long as tube; corolla pale yellow, 6–7 mm long; pod linear, subglabrous, 5–8 cm long, slightly arching, the reticulation broad, almost isodiametric. May–June. (Plate VIII, Figure 13).

Semideserts, steppes, and dry stony or gravelly slopes in the lower or rarely the middle mountain zone. — Centr. Asia: Balkh., T. Sh., Syr D., Kyz. K., Mtn. Turkm., Kara K., Amu D. **Gen. distr.**: Mong., Baluchistan. Described from Gyullibai in the Kyzyl-Kum Desert. Type in Leningrad.

15. **T. orthoceras** Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 39; Boiss. Fl. or. II, 77; Shmal'g., Fl. I, 223; Grossg., Fl. Kavk. 250; Kryl., Fl. Zap. Sib. VII, 1588. — T. polycerata M. B. Fl. taur.-cauc. II (1808) 222, non L.; Ldb. Fl. Ross. I, 533. — Ic.: Širjaev, Gen. Trig. rev. crit. IV (1931) tab. IX, f. 86 and tab. X, f. 5; Fl. Tadzhik. V, Plate 8, Fig. 4. — Exs.: Herb. Fl. Cauc. No. 179.

Annual; stems ascending, rarely erect, branched from base, 20–40 (50) cm long, subappressed-hirsute; stipules semisagittate, toothed at base; leaflets obovate-cuneate, dentate or incised; inflorescences subsessile, 1–4-flowered; bracteoles subulate; calyx slightly shorter than corolla, the teeth as long as tube; corolla light yellow, 5 mm long; standard obovate, slightly retuse; pods linear, 2–3 cm long and 1.5 mm broad or (in var. schugnanica m.) 4.5 cm long and 2 mm broad, erect, slightly curved, appressed-hairy, terminating in a very short beak, the intervein alveoli two to three times as long as broad; seeds oblong-cylindric, tuberculate. May–June.

Dry stony, gravelly, or melkozem [fine earth] slopes, fallows and cultivated land, from lowlands to the middle mountain zone. — European part: L. V.; Caucasus: Cisc., Dag., E. and S. Transc., Tal.; W. Siberia: Alt.; Centr. Asia: Ar.-Casp., Syr D., T. Sh., Mtn. Turkm., Amu D. **Gen. distr.**: Bal.-As. Min. (Asia Minor). Arm.-Kurd., Iran? Described from the Lepsa River. Type in Leningrad.

16. **T. monspeliaca** L. Sp. pl. (1753) 777; Ldb. Fl. Ross. I, 533; Boiss. Fl. or. II, 76; Shmal'g., Fl. I, 223; Grossg., Fl. Kavk. II, 258. — Ic.: Sibth. et Sm. Fl. Gr. VIII (1833) tab. 765; Rchb. Ic. Fl. germ. XXII, tab. 2110; Širjaev, Gen. Trig. rev. cr. IV (1931) tab. IX, f. 88 and tab. X, f. 4. — Exs.: Fl. Austro-hung. No. 2010.

Annual; stems ascending, often procumbent, appressed-hairy, usually branched from base, (3) 10–20 (40) cm long; stipules very small, semisagittate, the lower toothed; leaflets obovate-cuneate, 4–10 mm long and 3–7 mm broad, appressed-hairy; inflorescences axillary, numerous, 4–15-flowered, the flowers sessile or nearly so; calyx slightly shorter than corolla, the linear-subulate teeth longer than tube; corolla pale yellow, 4 mm long; standard obovate-oblong, slightly notched; pods stellately spreading, linear, 7–13 (20) mm long, 1–1.5 mm thick, slightly curved, hairy, rarely glabrous, the prominent oblique cross-veins slightly anastomosing, the beak very short; seeds ca. 1.5 mm long, finely tuberculate. April–June. (Plate VIII, Figure 15).

Dry stony or gravelly slopes, fallows, cultivated fields, and roadsides in the lower mountain zone. – European part: Bl., Bes., Crim.; Caucasus: Cisc., Dag., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: W. and E. Med., Centr. Eur., Bal.-As. Min., Arm.-Kurd., Iran., Mesopotamia. Described from the vicinity of Montpellier. Type in London.

Section 6. **CAPITATAE** (Boiss.) Širjaev, Gen. Trig. rev. cr. V (1932) 3. – Stipules toothed or the upper entire; racemes long-peduncled, densely capitate; pedicels erect; corolla blue; wings without projection; pod very small, slender-beaked; seeds ovoid, finely tuberculate or glabrous.

17. **T. coerulea** (Desr.) Ser. in DC. Prodr. II (1825) 181; Boiss. Fl. or II, 68; Shmal'g., Fl. I, 221; Grossg., Fl. Kavk. II, 256. – Melilotus coerulea Desr. ex Lam. Encycl. IV (1797) 62; Ldb. Fl. Ross. I, 534. – Ic.:
117 Curt. Bot. Mag. sér. I (1822) tab. 2283; Rchb. Ic. Fl. germ. XXII (1867–1886) tab. 58; Širjaev, Gen. Trig. rev. cr., V (1932) tab. XI, f. 96 et tab. XII, f. 13.

Annual; stems 30–60 cm long, erect, densely branched; branches erect; stipules triangular-lanceolate, toothed; leaflets sharp-dentate, ovate, 2–5 mm long and 1–2 cm broad, those of upper leaves oblong; peduncle exceeding subtending leaf; inflorescence densely capitate, spherical, not elongating and not becoming loose in fruit; calyx half as long as corolla, the lanceolate teeth as long as tube; corolla 5.5–6.5 mm long, blue; standard oblong, retuse; pod obovoid-rhombic, 4.5 mm long, three times length of calyx, abruptly attenuate to beak 2 mm long, obscurely veined. June–July. (Plate IX, Figure 1).

Cultivated and sometimes occurring in weed-infested places, at roadsides, etc. – European part: Balt., M. Dnp., U. Dns., Bl., Bes., V.-Don, Crim.; Caucasus: Cisc., W. Transc. **Gen. distr.**: Centr. Eur., Med., Bal.-As. Min. (Balkans). Described from cultivated specimens. Type in Paris.

18. **T. procumbens** (Bess.) Rchb. Pl. crit. IV (1826) 35, f. 525; Grossg., Fl. Kavk. II, 256. – Melilotus procumbens Bess. Enum. pl. (1822) 30. – Trigonella besseriana Ser. in DC. Prodr. II (1825) 181; Boiss. Fl. or II, 68; Grossg., Fl. Kavk. II, 256. – T. coerulea var. besseriana Trautv. ex Shmal'g., Fl. I, 222. – Melilotus coerulea b. laxiflora Rochel ex Ldb. Fl. Ross. I (1842) 535. – Ic.: Rchb. Pl. crit. IV, tab. 344, f. 525; Širjaev, Gen. Trig. rev. cr. V (1932) tab. XI, f. 94, 95 et tab. XII, f. 14, 15. – Exs.: Dörfler, Herb. Norm., No. 4035; Fl. Austro-Hung. exs. No. 427.

Annual; stems 30–80 cm long, weak, decumbent or ascending, rarely suberect, usually branched from base; stipules triangular-lanceolate, toothed; leaflets rather narrow, those of upper leaves oblong-lanceolate to linear, the lower oblong, all sharp-dentate, 12–28 mm long and 3–8 mm broad; peduncle exceeding subtending leaf; inflorescence densely 20–30-flowered, subcapitate in flower, elongating in fruit and then oblong-ovaloid and rather loose; calyx half as long as corolla, the teeth as long as tube; corolla 5.5–6.5 mm long, pale blue; standard oblong; pod obovoid-rhomboid, four times the length of the calyx tube, 4.5 mm long, gradually tapering to a subulate beak, prominently nerved. June–July. (Plate IX, Figure 2).

Wet, sometimes boggy, often saline places. — European part: M. Dnp., Bl., V.-Kama, V.-Don, Bes., Crim.; Caucasus: Cisc., Dag., E. and W. Transc.; E. Siberia: Dau. (Nerchinsk). **Gen. distr.**: Atl. and Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd. Described from Podolia. Type in Kiev.

19. **T. capitata** Boiss. Diagn. pl. nov. 1, 2 (1843) 17; Ej. Fl. Or. II, 68; Grossg., Fl. Kavk. II, 256. — Ic.: Širjaev, Gen. Trig. rev. cr. V (1932) tab. XI, f. 97 and tab. XII, f. 11.

Annual; stems erect or ascending, 40—70 cm long, branched; stipules linear-lanceolate, toothed at base, the upper ones entire; leaflets oblong to oblong-linear, dentate, glabrate, 12—20 mm long and 3—7 mm broad; peduncle two to three (five) times the length of subtending leaf, elongating in fruit to 10 cm; inflorescence densely capitate, 7—8 mm long; calyx slightly shorter than corolla, the teeth one and a half times as long as tube; corolla light blue, ca. 4 mm long; pod 1-seeded, 3 mm long including beak, ovoid, glabrous, nerved, abruptly beaked; beak subulate, bent upward, as long as the pod; seeds small, ca. 1 mm long, smooth. June—July. (Plate XI, Figure 3).

Bogs and boggy meadows. — Caucasus: S. Transc. (Aras River valley). **Gen. distr.**: E. Med. (?), Bal.-As. Min. (Asia Minor), Iran. Described from the banks of the Euphrates in Cappadocia. Type in Geneva.

Section 7. **BIEBERSTEINIANAE** Širjaev, Gen. Trig. rev. cr. V (1932) 18 pro subsect. — Stipules entire; flowers bracteolate, in a densely capitate long-peduncled raceme; wings without interlocking projection; corolla blue; pod lanceolate, attenuate to an oblong beak; seeds finely tuberculate.

20. **T. coerulescens** (M. B.) Halaczy Consp. Fl. graec. I (1901) 351; Grossg., Fl. Kavk. II, 255. — Trifolium coerulescens M. B. Fl. Taur.-cauc. III (1819) 503. — Trigonella azurea b. C. A. M. Verzeichn. cauc. (1831) 136; Ldb. Fl. Ross. I, 531; Boiss. Fl. or. II, 67; Shmal'g., Fl. I, 222. — Ic.: Širjaev, Gen. Trig. rev. cr. V (1932) tab. XI, f. 98 et tab. XII, f. 6. — Exs.: Herb. Fl. Cauc. No. 122.

Annual, softly patulous-pubescent throughout; stems ascending, 10—20 (40) cm long, branched; stipules ovate-subulate, few-toothed; leaflets obovate, cuneate at base, sharp-dentate at summit, 8—12 mm long and 4—8 mm broad, rarely to 20 mm long and 12 mm broad; peduncle equaling or exceeding the subtending leaf, 1—2 cm long, rarely not more than 3—7 mm long (v. brachypoda J. Bornm.); inflorescence dense, capitate, 10—15-flowered; pedicels very short; bracteoles longer than calyx tube; calyx tubular, the teeth as long as tube; corolla light blue; standard narrow, oblong; pod 10—15 mm long, lance-oblong, four to five times as long as broad, straight or slightly curved, scarcely hairy, with inconspicuous longitudinally anastomosing veins, the slightly recurved beak 3—5 mm long; seeds ovoid, finely tuberculate. April—May. (Plate IX, Figure 4).

Dry gravelly and stony places, rarely cultivated fields, in plains and foothills. — European part: Crim.; Caucasus: Cisc., E., W., and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: Med., Bal.-As. Min. (Asia Minor), Iran. Described from the Anketeri Desert in the lower reaches of the Terek and Kuma rivers. Type in Leningrad.

Section 8. **GLADIATAE** Boiss. Fl. Or. II (1872) 65. — Stipules entire; flowers ebracteolate, solitary or paired, pale yellow; wings without an attachment tooth; pod lanceolate, to 4—5 cm long, long-beaked; seeds minutely tuberculate.

21. **T. gladiata** Stev. in Fischer, Cat. Horti Gorenk. (1808) 112; Ldb. Fl. Ross. I, 531 p. p.; Boiss. Fl. or., II, 69; Shmal'g., Fl. I, 223; Grossg., Fl. Kavk. II, 255. — Ic.: Rchb. Ic. Fl. Germ. XII (1902) tab. 2107, f. I—II, 1—6; Širjaev, Gen. Trig. rev. crit. V, tab. XI, f. 99, 108 et tab. XII, 3—5, 9, 10. — Exs.: Heldreich, Herb. graec. No. 595.

Annual; stems ascending, rarely erect, slightly branched, 5—20 (30) cm long, more or less pubescent; stipules very small, entire; leaflets obovate to oblanceolate, cuneate at base, 5—12 mm long and 3—6 mm broad, sharp-toothed at summit; flowers solitary or paired in the leaf axils, sessile; bracteoles none; calyx hairy, two-thirds as long as corolla, the teeth as long as tube; corolla 8—10 mm long, pale yellow; standard violet-tinged, obovate-oblong, slightly retuse; pod straight or slightly curved, compressed, 2—3 cm long excluding beak and to 4—5 mm in diameter, rather abruptly beaked, with prominent longitudinally anastomosing veins 5—7-seeded; beak 1—2 cm long, as long as the pod, straight; seeds ovoid, ca. 3 mm long, densely tuberculate. May—June. (Plate IX, Figure 5).

Dry stony and gravelly slopes in the lower or rarely the middle mountain zone. — European part: Crim.; Caucasus: Cisc., W. Transc. (Glebovka?), S. and E. Transc., Dag., Tal. **Gen. distr.**: Med., Bal.-As. Min. Described from the Crimea. Type in Leningrad.

***T. foenum graecum** L. Sp. pl. (1753) 777; Grossg., Fl. Kavk. II, 255. — T. gladiata Ldb. Fl. Ross. I, 531, p. p. — Ic.: Rchb. Fl. germ. XXII (1867—1886) tab. 57; Širjaev, Gen. Trig. rev. cr. V, tab. XI, f. 100, 103, 104.

Annual; stems erect, rarely ascending, 10—50 cm long, rather coarse, loosely branched; stipules ovate, acuminate, entire; leaflets ovate to oblong-lanceolate, 2—3 cm long and 1—1.5 cm broad, toothed in upper part; flowers sessile, solitary or paired in the leaf axils; calyx tubular, half as long as corolla, the teeth as long as tube; corolla 13—18 mm long, whitish yellow, faintly violet-tinged at base; standard oblong, retuse; pod linear, straight or slightly curved, beakless, 6—10 cm long and 4—5 mm thick, glabrous or more or less hairy, gradually attenuate to a straight beak 2—2.5 cm long, 10—20-seeded, with predominantly longitudinal anastomosing veins, seeds oblong, to 5 mm long, finely tuberculate. June. (Plate IX, Figure 6).

120 Cultivated in the Caucasus, S. Transcaucasia, and Talysh (Diabad). **Gen. distr.**: Arm.-Kurd., Mesopotamia. Described from plants grown in Montpellier. Type in London.

Economic importance. Used as fodder in combination with other plants. Growing better in S. Transcaucasia than alfalfa and requiring much less water. According to G. I. Shiryaev, T. foenum graecum grows wild in Mesopotamia and Kurdistan, whence it has spread widely in cultivation.

Subgenus 2. **POCOCKIA** (Ser.) Grossh. comb. — Pocockia Ser. in DC. Prodr. II (1825) 185. — Pod flat, elliptic or oblong or more or less lunate, subcoriaceous or membranous, (1) 2-seeded, usually beaked. Annuals or perennials, sometimes emitting a strong odor of coumarin.

Section 1. **CRETACEAE** Grossh. — Perennials, woody at base; corolla of the alfalfa type, i.e., standard interlocking with keel by a projection; pod elliptic-lunate, wingless, short-beaked, with prominent radial nerves.

22. **T. cretacea** (M. B.) Grossh. comb. nova. — Medicago cretacea M. B. Fl. taur.-cauc. II (1808) 223; Ldb. Fl. Ross. I, 523; Boiss. Fl. or. II, 23; Shmal'g., Fl. I, 225; Grossg., Fl. Kavk. II, 261.

Perennial; stems woody at base, numerous from common rootstock, branched 10—25 cm long, glabrate; stipules narrowly lanceolate, acute, toothless, prominently veined; leaflets stiffish, broadly obovate-cuneate, 5—6 mm long and 4—5 mm broad, conspicuously veined; inflorescence 4—6 (8)-flowered, loosely capitate; peduncle usually not exceeding the subtending leaf; bracteoles very small, subulate; pedicels the length of calyx, finally recurved; calyx about half as long as corolla, the unequal subulate-pointed teeth longer than tube; corolla bright (orange?) yellow, 4—5 mm long; standard oblong; pod elliptic, curved, 5—6 mm long and 4—5 mm broad, with thickened sutures, the prominent veins radially spreading, the short beak almost straight. May—July. (Plate IX, Figure 7).

Dry, mostly calcareous slopes in the lower mountain zone. — European part: Crim.; Caucasus: W. Transc. Endemic. Described from the Crimea. Type in Leningrad.

Section 2. **PECTINATAE** Boiss. Fl. or. II (1872) 90. — Annuals without glandular hairs; corolla of the alfalfa type (i.e., standard interlocking with keel by a projection); pod lunate or slightly curved, beakless, toothed-ciliate along the sutures; seeds tuberculate or rugose.

23. **T. radiata** (L.) Boiss. Fl. or. II (1872) 90; Grossg., Fl. Kavk. II, 256. — Medicago radiata L. Sp. pl. (1753) 778. — Ic.: Fl. Tadzhik. V (1937), Plate 9. — Exs.: H. F. A. M. No. 254; Fl. or. exs. No. 88.

Annual; stems erect, branched, covered with short subappressed hairs, (5) 10—25 cm long; stipules lance-subulate, toothed at base; leaflets cuneate-obovate, 8—10 mm long and 4—6 mm broad, subappressed-pubescent, the margin sharply denticulate; flowers solitary or paired, the slender peduncle equaling or exceeding the subtending leaf; braceoles very small, subulate; calyx slightly shorter than corolla, the subulate teeth longer than tube; corolla yellow, 4—5 mm long; standard obovate-oval; pod lunate, flat, glabrous, 15—20 mm long and 6—8 mm broad, with dense radical veins, beakless, glabrous, 4—6-seeded, the outer margin toothed, the inner with minutely denticulate wing; seeds ovoid, 3 mm long, buff, transversely rugose. May—June. (Plate IX, Figure 8).

Dry stony and gravelly slopes in the lower mountain zone. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm., Syr. D., T. Sh. **Gen. distr.**: W. and E. Med., Bal.-As. Min. (Asia Minor), Arm.-Kurd., Iran. Described from Italy. Type in London.

Section 3. **LUNATAE** Boiss. Fl. or. II (1872) 88. — Annuals, often glandular-hairy; corolla of the alfalfa type (i.e., standard interlocking with keel by a projection); pod slightly curved, lunate, short-beaked, inconspicuously cross-veined, wingless.

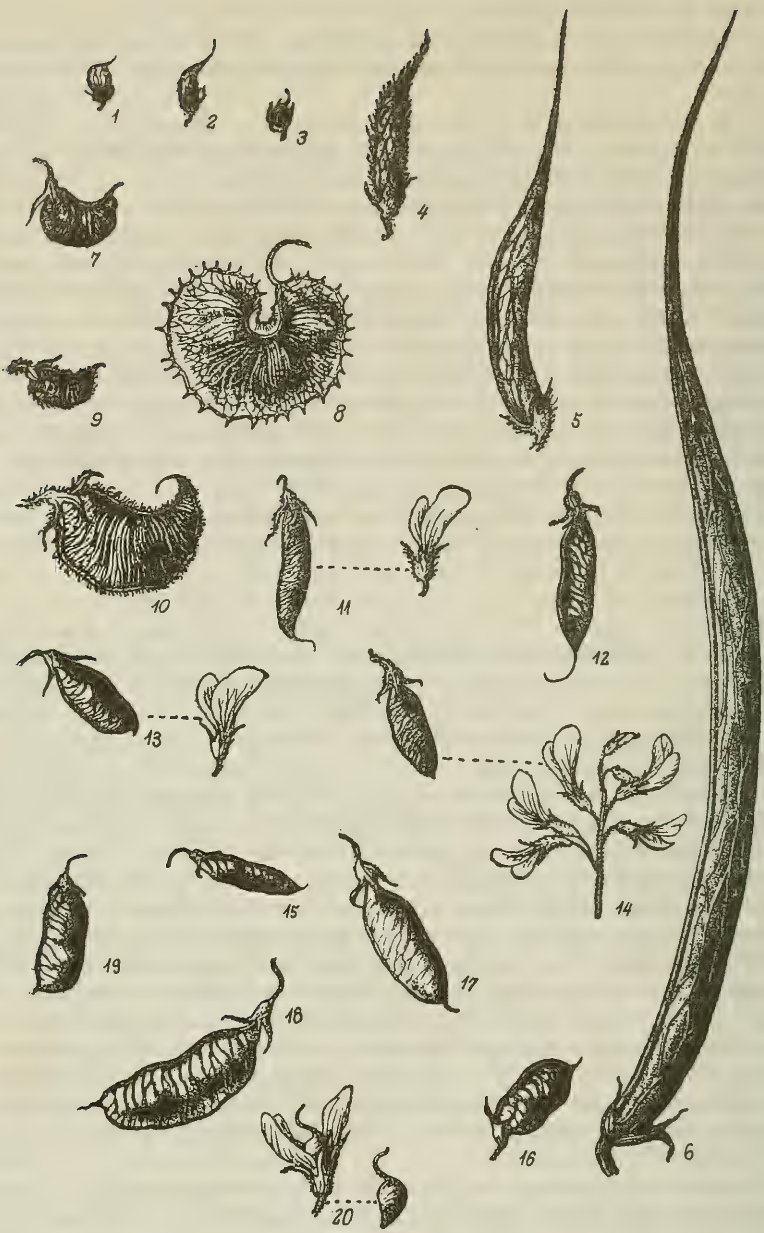

PLATE IX. 1 – Trigonella coerulea (Desr.) Ser.; 2 – T.procumbens (Bess.) Rchb.; 3 – T.capitata Boiss.; 4 – T.coerulescens (M.B.) Halaczy; 5 – T.gladiata Stev.; 6 – T.foenum graecum L.; 7 – T.cretacea M.B.; 8 – T.radiata (L.) Boiss.; 9 – T.brachycarpa Fisch; 10 – T.biflora Griseb.; 11 – T.pamirica Boriss.; 12 – T.badachschanica Aphan.; 13 – T.lipskyi Šir.; 14 – T.laxiflora Aitch.et Bak.; 15 – T.adscendens (Nevski) Aphan. et Gontsch.; 16 – T.ruthenica L.; 17 – T.korshinskyi Grossh.; 18 – T.platycarpos L.; 19 – T.popovii E.Kor.; 20 – T.gordejevi (Kom.) Grossh.

24. **T. brachycarpa** (Fisch.) Moris. in Mém. Acad. Toron. XXXVI (1833) 190; Grossg., Fl. Kavk. II (1930) 257. — Medicago brachycarpa Fisch. in M. B. Fl. taur.-cauc. III (1819) 517. — M. glomerata Fisch. ex Moris. l. c., — T. glomerata Hort. Paris, ex Fisch. et Mey. in Bull. Soc. Nat. Mosc. (1838) 340; Ldb. Fl. Ross. I, 531; Boiss., Fl. Or. 89. — Pocockia glomerata Boiss. Diagn. sér. I, 9 (1849) 12. — Širjaev Gen. Trig. rev. cr., I, tab. II, f. 31 and tab. III, f. 34—41 (1928).

Annual or biennial, densely puberulent, the hairs ferruginous when dry; stems rather robust, erect, rarely ascending, 5—20 (30) cm long; stipules ovate-subulate, entire or slightly toothed; leaflets obovate-cuneate, 9—15 mm long and 3—7 mm broad; inflorescence sessile, rarely with peduncle to 1 cm long, densely capitate, with subsessile flowers; calyx about as long as corolla, the teeth one-quarter to half as long as tube; corolla pale yellow, 2.5—3 mm long; standard obovate; pod horizontally spreading, oval-lunate, flat, 4—6 mm long and 3—5 mm broad, terminating in a short straight beak, the prominent
24 transversal veins not coalescent; seeds ovoid, smooth. April—May. (Plate IX, Figure 9).

Grass and gravel slopes, scrub, vineyards, and derelict plowfields in the lower mountain zone. — Caucasus: E. and S. Transc. **Gen. distr.**: Bal.-As. Min. (Asia Minor), Arm.-Kurd. Described from Kodzhori near Tbilisi.

25. **T. biflora** Griseb. Sp. fl. Rum. I (1843) 46. — T. lunata Boiss. Diagn. pl. nov., sér. 1, 2 (1843) 19; Ej. Fl. or. II (1872) 88; Grossg., Fl. Kavk. II, 257. — Ic.: Širjaev, Gen. Trig. rev. cr., I, tab. II, f. 29 and tab. III, f. 31, 32 (1928).

Annual, softly glandular-pubescent; stems weak, ascending, rarely erect, 10—20 cm long, branched; stipules ovate-lanceolate, acuminate, toothed; leaflets obovate to obovate-cuneate, 5—10 mm long and 4—6 mm broad; peduncle 3—8 mm long, shorter than subtending leaf; inflorescence umbellate, 1—3-flowered; flowers subsessile or short-pediceled; calyx yellow, rarely bluish, 7 mm long; standard obovate, retuse, as long as the wings; pod flat, lunate, 15—22 mm long and 8—10 mm broad, 7- or 8-seeded, with numerous slender parallel veins; seeds ca. 2 mm long, tuberculate. May. (Plate IX, Figure 10).

Dry stony slopes, dry waterways, and cultivated land. — Caucasus: S. Transc. **Gen. distr.**: Bal.-As. Min. (Asia Minor), Arm.-Kurd. Described from Modurlu in Bithynia.

Section 4. **ELLIPTICAE** Boiss. Fl. or. (1872) 87, emend. — Perennials, without glandular hairs; standard without interlocking projection; fruit subcoriaceous, ellipsoid or lance-oblong, more or less compressed, straight or rarely somewhat curved, beakless, densely transversely or obliquely veined, wingless (in USSR species) or winged.

26. **T. pamirica** A. Boriss. in Not. Syst., VII, f. 11 (1937) 225. — T. griffithi Aphan. et Gontsch., Fl. Tadzhik. V (1937) 175, non Boiss. — T. emodi a) litvinovii Širjaev, Gen. Trig. rev. cr. I (1928) 29. — Ic.: Not. Syst. VII, f. 11 (1937) 226. — Exs.: H. F. A. M. No. 217.

Perennial with thickened rootstock; stems ascending or erect, 30 (40) 50 cm long; stipules incised-toothed at base, rarely entire; leaflets obovate-cuneate, sharp-dentate, 9—18 mm long and 5—9 mm broad; peduncle longer than the subtending leaf; inflorescence umbelliform, 2—10-, mostly 5—8-

flowered, the flowers finally nodding; pedicels 2–3 mm long; calyx half as long as corolla, the linear-lanceolate teeth as long as tube; corolla yellow, (8) 10 (14) mm long; pod oblong-elliptic, flat, obliquely veined, (10) 11–13 (16) mm long, ca. (3) 4 mm broad, 3- or 4-seeded, wingless, glabrous 125 or rarely hairy; seeds smooth. May–June. (Plate IX, Figure 11).

Dry stony slopes in the middle and upper mountain zones, up to 4,500 m.– Centr. Asia: Syr D., T. Sh., Pam.-Al. Endemic (?). Described from Pamir. Type in Leningrad.

27. **T. badachschanica** Aphan. in Fl. Tadzhik. V (1937) 176, 652.

Perennial; stems numerous, 30–40 cm long, branched, ascending; stipules semisagittate, the lower broadly lanceolate, entire or obscurely obtuse-toothed at base; leaflets rounded-cuneate, slightly emarginate, denticulate, 8–10 mm long and 6–7 mm broad; peduncle 20–30 mm long, elongating in fruit to 90 mm; inflorescences loosely 2–10-flowered; calyx campanulate, the linear-subulate teeth as long as tube; corolla light yellow, 10–11 mm long; standard rounded at apex; pod oblong, 15–18 mm long and 3.5–4 mm broad, short-beaked, glabrous, 3- or 4 (5)-seeded, the oblique veins arising from both sutures and anastomosing at center. May–June. (Plate IX, Figure 12).

Dry stony slopes in the middle mountain zone. Found in Afghanistan at the border with Tadzhikistan on the left bank of the Panj River between Dzhumardzh and Omer; apparently also growing in Tadzhikistan.

28. **T. lipskyi** Širjaev, Gen. Trig. rev. cr. I (1928) 24.– T. zaprjagaevi Aphan. et Gontsch. in Fl. Tadzhik. V (1937) 174, 652.– Ic.: Širjaev, l. c., tab. I, f. 13, tab. III, f. 14–17 (1928) Fl. Tadzhik. V (1937), Plate 8, Figs. 7–8 and Plate 11.

Perennial; stems 35–50 cm long, branched; lower stipules semisagittate, incised-toothed, the upper entire; leaflets obovate to suborbicular, cuneate at base, sharp-dentate, 12–15 (22) mm long, 9–10 (15) mm broad; peduncle to 5–6 cm long; inflorescence loosely umbellate, 3–5 (6)-flowered, the slender pedicels 2–3 mm long; calyx one-fifth to one-third as long as corolla, the triangular teeth as long as tube; corolla yellow, 8–10 mm long; standard shorter than keel; pod oblong, 14–20 mm long and 5–6 mm broad, flat, glabrous, transversely and obliquely veined, 1- or 2-seeded, short-beaked; seeds ca. 4 mm long, ovoid, glabrous. May–June. (Plate IX, Figure 13).

Middle mountain zone, up to 1,500 m; stony places.– Centr. Asia: Pam.-Al. Endemic. Described from Gilyar. Type in Leningrad.

Note. T. zaprjagaevi was described from specimens with immature pods. The immature pods of T. lipskyi are numerous, 2–3 mm broad; they become broad in maturity and the number of seeds is reduced to 2 by abortion. The single mature pod on the specimen of T. zaprjagaevi is 126 also 2-seeded. There is no justification for the separation of T. zaprjagaevi as a distinct species,* since it is merely a synonym of P. lipskyi.

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* There is, however, no reason to doubt that T. zaprjagaevi Aphan. et Gontsch. is a distinct species, clearly distinguishable from T. lipskyi Šir., both morphologically and ecologically. In the case of T. zaprjagaevi, the mature pods are not more than 4 mm broad and resemble those of T. griffithii Boiss., while the leaflets are stiff and serrulate-denticulate. T. lipskyi occurs in wood-and-scrub thickets, whereas T. zaprjagaevi occurs on conglomerate outcrops in the ephemeral vegetation belt. T. zaprjagaevi approaches T. griffithii, differing in the color and size of corolla as well as in other characters. – Editors.

29. **T. laxiflora** Aitch. et Bak. in Trans. Linn. Soc., sér. 2, III (1886) 47; Širjaev, Gen. Trigonella rev. cr. I (1928) 23. — Ic.: Širjaev, l. c., tab. II, f. 24.

Perennial; stems 30—50 cm long, erect, branched, woody at base, the upper part of the plant (young leaves and inflorescences) softly white-puberulent; stipules small, entire; leaflets obovate-cuneate, awned from apical notch, dentate in upper part, 8—10 mm long, glabrous above, more or less covered beneath with soft spreading hairs; racemes loosely 6—12-flowered, the flowers finally up to 5—6 mm apart; peduncle 4—5 mm long; calyx 4 mm long, the triangular-lanceolate teeth shorter than tube; corolla light mauve, 8—9 mm long; standard slightly retuse; pod 20—25 mm long and ca. 5 mm broad, glabrous, obliquely parallel-veined; seeds obliquely ovoid, smooth, 3—4 mm long. (Plate IX, Figure 14).

Dry clayey slopes in the foothill zone. — Centr. Asia: Mtn. Turkm. (Kushka area). **Gen. distr.**: Iran. Described from Badghis in Afghanistan. Type in London; cotype in Leningrad.

30. **T. adscendens** Aphan. et Gontsch., Fl. Tadzhik. V (1937) 181. — T. emodi var. litvinowii f. violacea Širjaev, Gen. Trig. rev. cr. I (1928) 19 p.p. — Botryolotus adscendens Nevski in Acta Inst. Bot. Ac. Sc. URSS. ser. 1, f. 4 (1937) 249.

Perennial, with a rather stout rootstock; stems erect or rarely ascending, 20—40 (50) cm long; stipules incised-toothed at base, the upper entire; leaflets obovate-cuneate, 6—8 (12) mm long and 3—6 mm broad, closely dentate; peduncle exceeding the subtending leaf, 2—3 cm long; inflorescence loosely umbellate, (3) 5—8 (10)-flowered, the flowers finally nodding; bracteoles very small; pedicles 1—2 mm long; calyx two-fifths to half as long as corolla, the triangular-subulate teeth as long as tube, mostly suffused with bluish; corolla yellow, 8 (10) mm long, finally lilac-violet and drying this color, rarely only the upper tip of standard and keel bluish and the lower part mauve; pod oblong-elliptic, glabrous, 9—10 (12) mm long and (2) 3 mm broad, finely transverse-veined, 2—4-seeded, glabrous or hairy (f. pilosa m.); seeds smooth. May—June—July. (Plate IX, Figure 15).

Middle mountain zone; stony and dry slopes. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Kugitang. Type in Leningrad.

31. **T. ruthenica** L. Sp. pl. (1753) 776. — Medicago ruthenica Ldb. Fl. Ross. I (1842—1844) 523.

Perennial, with a stout rootstock, more or less appressed-hairy, rarely glabrate; stems usually numerous, erect, branched above, 30—60 cm long; stipules rather large, lance-subulate, 1-toothed at base; leaflets oblong-oblanceolate to linear-oblong, (8) 12—15 (22) mm long and (2) 3—4 mm broad, dentate in upper part, more or less appressed-hairy; peduncle 2—3 (5) cm long, two to three times the length of subtending leaf; inflorescence rather dense, capitate-umbellate, 4—10 (12)-flowered, the slender pedicels 2 mm long; bracteoles very small, subulate; calyx one-third to half as long as corolla, the triangular teeth shorter than tube; corolla 5—6 mm long, yellow or more less violet-tinged; standard oblong; pod flat, oblong-elliptic, straight or slightly curved, 8—12 mm long and 3—4.5 mm broad, netted-veined with large alveoles, (1) 2—5-seeded, the short beak uncinately upcurved; seeds ovoid, ca. 2 mm long, brownish, smooth. June—July. (Plate IX, Figure 16).

Steppes, dry slopes, sands, and meadows. — W. Siberia: Irt.; E. Siberia: Ang.-Say., Dau. Endemic. Described from Siberia. Type in London.

32. **T. korshinskyi** Grossh. nom. nov. — Medicago ruthenica Kom. et Alis., Opred. rast. Dal'nevost. kr. II (1932) 662 p. p., non L.

Perennial, with rather stout creeping rhizome; stems robust, erect, few-branched, appressed-pilulose, 40—60 cm long; stipules rather large, lanceolate, acute, 2- or 3-toothed at base; leaflets firm, light green, obovate to broad-obovate, cuneate at base, prominently veined, sharp-dentate; racemes rather compactly 3- or 4-flowered; peduncle equaling or slightly exceeding the subtending leaf; bracteoles very small, subulate; pedicels 3—4 mm long, finally subhorizontally spreading; calyx half as long as corolla, the triangular-subulate teeth as long as tube; corolla yellow, violet-nerved, turning blue in drying, 5—6 mm long; standard oblong; pod 2—4-seeded, 11—12 mm long and 4 mm broad, flat, oblong, attenuate at both ends, pointed, glabrous, prominently netted-veined, almost straight dorsally, more or less arching ventrally, the very short beak bending upward. July—August. (Plate IX, Figure 17).

128 Stony slopes. — Far East: Ze.-Bu. Endemic. Described from the village of Bakhareva on the Bureya River. Type in Leningrad.

33. **T. platycarpos** L. Sp. pl. (1753) 776. — Medicago platycarpos Ldb. Fl. Ross. I (1842—1844) 523; Kryl., Fl. Zap. Sib. VII, 1589. — T. ruthenica Patrin in Ldb. Fl. Alt. III (1831) 253, non L. — Exs.: HFR N. 1159.

Perennial, glabrate; stems erect, 40—80 cm long, few-branched (or 15—25 cm long and profusely branched from base — v. potanini Sumn.); stipules large, triangular-lanceolate, toothed; leaflets rounded-obovate to oblong-rhombic, sharp-dentate, 25—35 mm long and 15—25 (35) mm broad; inflorescences on lateral branchlets with reduced leaves usually close to inflorescence; peduncle slender, 10—20 mm long; flowers (5) 8—12 (15), on pedicels 3—5 mm long; bracteoles minute, subulate; calyx half as long as corolla, the lance-subulate teeth slightly longer than tube; corolla 7—8 mm long, pale yellow; standard oblong; pod flat, black in maturity, 4—6-seeded, elliptic, (15) 18—22 mm long and 7—9 mm broad, rather sparsely and finely transverse-veined, the short beak vertically upcurved; seeds ovoid, ca. 2 mm long, yellowish, smooth. June—July. (Plate IX, Figure 18).

Shaded coppices and wood margins. — W. Siberia: U. Tob., Irt.; E. Siberia: Ang.-Say., Dau.; Far East: Uss.; Centr. Asia: T. Sh. (Karakol' area, Terskei Ala Tau Range). **Gen. distr.**: N. Mong. Described from Siberia. Type in London.

34. **T. popovii** E. Kor. in Not. Syst. ex Herb. Hort. Bot. Petrop. V, 11—12 (1914) 177. — Ic.: Fl. Tadzhik., Plate 8, Fig. 6 and Plate 10.

Perennial, sparingly hairy; stems erect or ascending, 30—60 cm long, rather slender, branched; stipules rather large, ovate-lanceolate, incised-toothed; leaflets obovate-subulate, mostly subrhombic, (4) 8—12 mm long and 4—7 (12) mm broad, acute, dentate; peduncle slender, 15—20 mm long, slightly exceeding the subtending leaf; bracteoles very small, subulate; inflorescence racemose, loosely 2—6-flowered; pedicles slender, 3—4 mm long; calyx half as long as corolla, the triangular-subulate teeth slightly longer than tube; corolla 5—6 mm long, at first yellow, becoming red, in drying almost violet; pod elliptic, (5) 6—8 (10) mm long and 4—5 mm broad, flat, (1) 2- or

3-seeded, rather sparsely and finely transverse-veined, with a short uncinate beak. June–July. (Plate IX, Figure 19).

Middle mountain zone; stony and clayey slopes.— Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from the Gissar Range. Type in Tashkent.

Section 5. **PERSISTENTES** Grossh.— Perennials; standard without an attachment tooth, persistent and enveloping the fruit; pod short-elliptic, 2-seeded; seeds smooth.

35. **T. gordejevi** (Kom.) Grossh. comb. nova.— Medicago gordejevi Kom. in Kom. and Alis., Opred. rast. Dal'nevost. kr. II (1932) 661.— Ic.: Ibid. tab. 198.

Perennial; rhizome rather long and stout; stems weak, ascending, branched, 50–80 cm long, appressed-hairy; stipules lance-subulate, entire; leaflets firm, prominently veined, elliptic-obovate, bluntly emarginate, subulate at base, sharply denticulate, 8–15 mm long and (4) 5–10 (12) mm broad; flowers axillary, solitary or in 2- or 3-flowered racemes; peduncle equaling the subtending leaf; pedicels appressed-pubescent, (3) 5–10 mm long; bracteoles obsolescent; calyx about half as long as corolla, the subulate teeth twice as long as tube; corolla 12–16 mm long, pink, marcescent and enveloping the fruit; standard oblong, as long as wings, and keel; pod 2-seeded, elliptic-oblong, glabrous, 8–9 mm long and 3 mm broad, flat, obscurely veined, the short beak strongly upcurved; seeds rounded-ovoid, glabrous. June–September. (Plate IX, Figure 20).

Rock crevices and riverine pebbles.— Far East: Uss. Endemic. Described from the village of Kharysovka on the Semdzha River, a tributary of the Suifun. Type in Leningrad.

Genus 790. **MEDICAGO** * L.**

L. Gen. pl. (1754) 339.

Calyx 5-toothed; keel obtuse; corolla papilionaceous; stamens diadelphous, the upper stamen free; filaments not dilated; pod few-seeded, rarely 1-seeded, falcate or reniform or in a spiral of one to many sometimes united turns, smooth or spiny; style in fruit always spiral. Annual or perennial herbs, rarely undershrubs; leaves 3-foliolate; stipules 2, mostly well developed, adnate to petiole. Type species M. arborea L. Russian: name: lyutserna.

Note. The genus Medicago contains one of the world's most important forage plants, M. sativa (alfalfa), cultivated at present in all warm and temperate regions and represented by an enormous number of varieties and strains. Nearly all the wild alfalfas of the M. sativa series grow in the USSR and so far have scarcely been tested. They are undoubtedly of great food value. As some of them are very drought-resistant, their introduction into cultivation may be expected to play a

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* Name used by Pliny for alfalfa.

** Treatment by A.A.Grossheim.

130 considerable role in rehabilitation of arid and desert regions of the USSR (see notes to individual species).

For precise identification of perennial medicks, it is necessary to secure plants with a sufficient number of flowers and mature pods; in the case of annual species, plants with mature pods are needed.

1. Pod not spirally coiled . . . . . . 2.
+ Pod in a spiral of 1–8 turns . . . . . . 7.
2. Pod reniform, 2–3 mm long, 1-seeded, black in maturity; stipules ovate-lanceolate, the upper entire, the lowermost with 1–3 broadly triangular teeth (throughout the USSR) . . . . . . 1. **M. lupulina** L.
+ Pod falcate or semicircular, not reniform . . . . . . 3.
3. Flowers 5–6 mm long, always violet-blue; pod small, falcate, tuberculate-rugose (Kazakhstan) . . . . . . 10. **M. trautvetteri** Sumn.
+ Flowers 6–13 mm long . . . . . . 4.
4. Flowers variously colored, mostly blue, violet, azure, or pale azure, rarely yellow to almost white (Transc. and Dag.) . . . . . . 13. **M. hemicycla** Grossh.
+ Flowers always yellow . . . . . . 5.
5. Pods on pendulous stipe, lunate, glabrous . . . . . 5. **M. borealis** Grossh.
+ Stipes erect . . . . . . 6.
6. Pod lunate, coiled through half a turn to a full turn, glabrous or slightly hairy . . . . . . 6. **M. falcata** L.
+ Pod straight or subfalcate, i.e., coiled through less than half a turn . . . . . . 7. **M. romanica** Prod.
7. Pod without spines or tubercles . . . . . . 8.
+ Pods beset with spines or tubercles . . . . . . 22.
8. Flowers and pods solitary; pod densely tomentose, subglobose; a low annual (Turkmenistan-Uzbekistan) . . . . . . 36. **M. lanigera** Winkl. et B. Fedtsch.
+ Plants different from the above . . . . . . 9.
9. Pod 12–17 mm in diameter . . . . . . 10.
+ Pod to 9 mm in diameter . . . . . . 11.
131 10. Pod lenticular, gently biconvex, in a spiral of 3–4 loosely appressed horizontal turns (Crimea, Caucasus, Central Asia) . . . . . . 21. **M. orbicularis** All.
+ Pod not lenticular, plano-convex, in a close spiral of 5–6 vertical turns (Moldavian SSR, SW Ukraine) . . . . . . 20. **M. scutellata** All.
11. Annual; pod in a spiral of 3–8 turns, 5–7 mm in diameter, glabrous; stipules pectinate (Crimea) . . . . . . 22. **M. soleirolii** Duby.
+ Perennial; stipules not pectinate . . . . . . 12.
12. Pod densely glandular-pubescent . . . . . . 13.
+ Pod eglandular . . . . . . 15.
13. Pod 3–6 mm in diameter; corolla variously colored (violet, blue, yellow, white) (Centr. and S. Transc.) . . . . . . 14. **M. polychroa** Grossh.
+ Pod 6–9 (11) mm in diameter; corolla yellow or greenish yellow . . . . . . 14.
14. Corolla 9–15 mm long, narrow, yellowish or yellowish green; raceme loosely few-flowered; stems weak, ascending, 20–70 cm long (Dagestan) . . . . . . 16. **M. virescens** Grossh.

+ Corolla 8–12 mm long, broader, yellow, very rarely bluish-tinged; racemes containing more flowers; stems longer, much branched, ascending (mountainous zone of the Main Caucasus Range) . . . . **15. M. glutinosa** M. B.

15. Pod reniform, finely pubescent, 4 mm broad, in a spiral of 1 to 1.5 turns, the outer margin slightly thickened; stems numerous, slender from woody base, 10–25 cm long (Crimea, NW part of Caucasus) . . . . **2. M. rupestris** M. B.

+ Pod not reniform, in a spiral of more than 2 turns . . . . 16.

16. Pod with circularly thickened margin, the surface reticulate; stems virgate from woody base (N. Kazakhstan, Central and Southern Volga regions) . . . . **3. M. cancellata** M. B.

+ Margin of pod not circularly thickened . . . . 17.

17. Pod densely villous with white translucent implexed hairs, apparently globose, 5–7 mm in diameter; leaflets pubescent on both sides (Turkey) . . . . **17. M. papillosa** Boiss.

+ Pod glabrous or appressed-hairy, rarely more heavily vested but not apparently globose due to dense indument . . . . 18.

18. Bindweedlike plant; pod 3.5–6 mm in diameter, more or less hairy; stems 10–25(40) cm long, usually decumbent to ascending (Transcaucasia) . . . . **18. M. dzhawakhetica** E. Bordz.

+ Plants of plains and middle mountain zone; stems commonly erect, longer . . . . 19.

19. Pod 2–3 mm in diameter, with 2–3 coils, glabrous or appressed-hairy; corolla 5–6 mm long, violet, rarely whitish; racemes elongate-oblong, 1–4.5 cm long (S. Crimea) . . . . **9. M. coerulea** Less.

+ Pod 4–9 mm in diameter . . . . 20.

20. Pod in a spiral of 2–4 turns; corolla variously colored, mostly blue or violet, not white, yellowish, or greenish . . . . **8. M. sativa** L.

+ Pod in a spiral of 1–1.5 turns . . . . 21.

21. Pod in a spiral of a single turn, whitish gray by dense appressed hairs; corolla always yellow; stems to 40–50 cm long; leaflets rather narrow (Central Asia) . . . . **11. M. schischkinii** Sumn.

+ Pod in a spiral of 1–1.5 turns, sparsely appressed-hairy; corolla variously colored, violet, white, yellow, or pink; taller plants with broad leaflets . . . . **12. M. tianschanica** Vass.

22. Plant densely white-tomentose throughout; pod densely hairy, 5–6 mm in diameter; stems procumbent, trailing, 10–30 cm long; perennial (Black Sea coast in Crimea and Transcaucasia) . . . . **19. M. marina** L.

+ Indument not densely white-tomentose . . . . 23.

23. Leaflets pinnatifid or deeply toothed; stems decumbent, branched; pod densely beset with straight spines, 4–5 mm in diameter . . . . . (introduced in the Ukraine) . . . . **34. M. laciniata** L.

+ Leaflets never pinnatifid . . . . 24.

24. Coils of pod fused or tightly appressed and difficult to separate; spines usually not sulcate . . . . 25.

+ Coils of pod loosely incumbent and easily separable; spines deeply sulcate . . . . 31.

25. Pod cylindric, the surface of all the coils flat 26

+ Pod globose or ovaloid, both surfaces of the coils convex 30

26. Perennials 27

+ Annuals 28

133 27. Pod 5–6 mm in diameter, the edge beset with short appressed spines; corolla bright orange-yellow, 6–10 mm long (Crimea) . . . . 4. **M. saxatilis** M. B

+ Pod 3–4 (5) mm in diameter, glandular-pubescent, rarely subglabrous, the spines on the edge short, slender, slightly curved; corolla 6–8 mm long, white or pale blue (Dagestan) . . . . 32. **M. daghestanica** Rupr

28. Pod 4–6 mm in diameter, quite glabrous, forming 3–5 coils (coast of the Black and Caspian seas) . . . . 26. **M. litoralis** Rhode

+ Pod 6–10 mm in diameter 29

29. Pod 6–10 mm in diameter, quite glabrous, forming 4 coils; spines straight, thick, sometimes uncinate (Caucasus) . . . . 23. **M. tribuloides** Desr

+ Pod 8–10 mm in diameter, densely puberulous; spines not very long (S. Ukraine, Crimea, Caucasus) . . . . 25. **M. agrestis** Ten

30. Pod globose, 5–7 mm in diameter, forming 6–8 coils, glabrous, with short tuberclelike spines (W. Transc.) . . . . 27. **M. globosa** Presl

+ Pod doliform, 6–8 mm in diameter, forming 5–7 coils, appressed-puberulent; spines straight, unequal, not grooved at base (Caucasus, Central Asia) . . . . 24. **M. rigidula** Desr

31. Pod discoid, flat on both sides 32

+ Pod globose-ovaloid in outline 35

32. Pod 3 mm in diameter; spines united at base and forming a tall flat edging (reported for Azerbaijan) . . . . 33. **M. coronata** L

+ Pod not edged 33

33. Pod 3–4 mm in diameter, very loosely and remotely spiraling through 2–3 turns, with 2 rows of subulate uncinate spines (Crimea) . . . . 31. **M. praecox** DC

+ Pods 4–10 mm in diameter, without interspaces between coils. 34

34. Pod 7–10 mm in diameter, forming 4–6 coils; spines equaling pod diameter (Crimea) . . . . 30. **M. nigra** Willd

+ Pod 4–6 mm in diameter, forming 1.5–3 coils; spines shorter than pod diameter (Crimea, Caucasus, Central Asia) . . . . 29. **M. denticulata** Willd

134 35. Pod 5–8 mm in diameter, with 3–7 coils; spines in 2 rows, long, usually curved; leaflets often with a dark spot at base (Crimea, Caucasus) . . . . 28. **M. arabica** All

+ Pod 2.5–5 mm in diameter, densely spiny; spines rather long, straight, uncinate, rarely very short . . . . 35. **M. minima** (L.) Grufb

Subgenus 1. **LUPULARIA** (Ser.) Grossh. – Lupularia Ser. in DC. Prodr. I (1825) 172. – Pods reniform, 1-seeded, indehiscent or tardily dehiscent.

1. **M. lupulina** L. Sp. pl. (1753) 779; Ldb. Fl. Ross. I, 527; Boiss. Fl. Or. II, 105; Shmal'g., Fl. I, 228; Grossg., Obz. Krym.-Kavk. Medicago (1919) 11; Kryl., Fl. Zap. Sib. VII, 1594. – Ic.: Grossg. (1919), Figs. 1 and 2; Rchb. T. XXII, tab. 73; Fl. Tadzhik. V (1937), Plate 13. – Exs. HFR No. 411.

Annual or biennial; stems and leaves glabrous, pubescent or glandular; stems numerous, 10–50 cm long, slender, weak, usually decumbent to ascending; petioles ca. 1 cm long, occasionally those of lower leaves up to 7 cm; leaflets obovate to subrhombic, cuneate at base, toothed and emarginate at apex; stipules connate to one-third or to the middle, ovate-lanceolate or broad-lanceolate to lanceolate, long-acuminate, the upper mostly entire, the lower with 1–3 broadly triangular teeth; corolla 1–3 mm long, yellow; standard broad, equaling or exceeding the calyx by not more than three-quarters; calyx appressed-pubescent or glandular, broadly turbinate-campanulate, the linear-lanceolate acute teeth longer than tube; pedicel as long as or longer than calyx; bracts linear-subulate, usually shorter than pedicel; inflorescence ovoid to oblong-ovoid, densely 10–30-flowered, 5–15 mm long; peduncle slender, 2–3 cm long, considerably exceeding the subtending leaf; pod 2–3 mm long, ca. 1 mm broad, reniform, with a prominent network of arching nerves on the back, black in maturity, glabrous or appressed-hairy, or covered with white dots interspersed with simple hairs, or with articulate glands, or arachnoid with admixture of stalked glands, 1-seeded; seeds smooth, yellow or brown. May–July. (Plate X, Figure 2).

Var. 1. **vulgaris** Koch, Synops. ed. 2 (1845) 177. — Pod quite glabrous or covered with simple hairs, or with dots and hairs, but never with articulate hairs.

Meadows, scrub, wood margins, and grassy slopes. — European part: Lad.-Ilm. (rare), U.V., Balt., U. Dnp., M. Dnp., U. Dns., V.-Don, Transv., Bl., Bes., Crim.; Caucasus: Cisc., W., E., and S. Transc., Dag., Tal.; Centr. Asia: Ar.-Casp., T. Sh., Syr D., Pam.-Al., Kara K., Mtn. Turkm.

Var. 2. **willdenowii** Bönn. Prodr. Fl. Monast. (1824) 161. — Pods more or less profusely covered with articulate glandular hairs and sometimes also with arachnoid indument; glands also occurring on inflorescence, upper leaves, and stem.

Meadows, scrub, wood margins, pebbles; in the South mostly in river valleys; more mesophilous than var. vulgaris. — European part: Lad.-Ilm., U.V., V.-Kama, V.-Don, Transv., L. Don, Balt., U. Dnp., U. Dns., Bl., Bes., Crim.; Caucasus: Cisc., W., E., and S. Transc.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uss.; Centr. Asia: Ar.-Casp., Balkh., T. Sh., Syr D., Pam.-Al., Mtn. Turkm.

Var. 3. **perennans** Grossh., Fl. Kavk. II (1930) 260. — Perennials; lower internodes reduced; stems numerous, low, and often many sprawling.

Dry slopes, wood margins, scrub, and riverine pebbles. — European part: U. Dnp. (rare), U. Dns., (rare), V.-Don (rare), L. Don (rare), M. Dnp. (rare), Bl. (rare); Bes., Crim.; Caucasus: Cisc., W., E., and S. Transc., Dag., Tal.; Centr. Asia: Balkh., T. Sh., Syr D., Amu D., Pam.-Al. **Gen. distr.**: Scand., Centr. and Atl. Eur., Med. (W. and E.), Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Mong., Jap.-Ch., N. Am. (introduced). Described from Europe. Type in London.

Economic importance. As fodder this species has the following attributes: 1) relatively large leaf size and considerable amount of herbage developed by individual plants, 2) scant hairiness, and 3) small unarmed fruits. The disadvantages to be noted are: 1) weak stems, and 2) concentration of leaves in the lower part of the plant.

Plants of M. lupulina var. perennans Grossh. from Georgia gave the following analysis:

	In % of air-dry weight	In % of oven-dry weight
Hygroscopic water	11.60	
Crude protein	22.33	23.03
Crude fat	2.87	3.25
Nitrogen-free extract	32.06	36.28
Crude cellulose	23.77	26.87
Ash	9.34	10.57

The crude protein content is very high, exceeding even that of wild forms of M. sativa and related species. The perennial habit of var. perennans also constitutes an important attribute of this form as regards feed value. The aftermath can be used in herbage mixtures. Experiments with aftermath of var. perennans gave very satisfactory results. This variety can be 136 recommended for undersowing in exhausted grass stands even without previous soil cultivation.

The common annual M. lupulina has long been cultivated in Europe, but it has not attained wide distribution. We include the following data as supplied by H. Gams. In England, M. lupulina was introduced into cultivation in 1659, in France about 1785; in Germany it did not gain currency before the second half of the 19th century. The best varieties originate from Thuringia. M. lupulina requires fertile soil. Owing to its annual habit and the relatively lower herbage yields, it sometimes flourishes in places where cultivation of clover and alfalfa (M. sativa) is impossible or unsatisfactory, as for instance on calcareous soil. Since M. lupulina tends to lodge in pure stands, it is often used in mixtures with Medicago sativa, Trifolium pratense, T. repens, Lotus corniculatus, Arrhenatherum elatius, etc. Its value is greatest for cows, less so for horses. According to Yu. Kyun, as cited by V. G. Belyaev M. lupulina has the following percent composition for air-dry weight: hygroscopic water 16.7, crude protein 15.2, crude fat 3.0, nitrogen-free extract 28.9, crude cellulose 30.1, ash 6.1.

To judge from these data, the nutritive value of M. lupulina is sufficiently great and its cultivation can be recommended without hesitation for those places in the USSR where the cultivation of M. sativa and other legumes is impossible for climatic and other reasons.

Subgenus 2. **FALCAGO** Grossh. — Section Falcago Rchb. Fl. Excurs. (1831) 504. — Pod many-seeded, dehiscent, rarely indehiscent, the coils forming a spiral with pervious center, rarely pod not spiraling, falcate or lunate.

Series 1. **Rupestres** Grossh. — Pod spiraling through one incomplete turn, reniform, unarmed, finely pubescent.

2. **M. rupestris** M. B. Fl. taur.-cauc. II (1808) 225; III (1819) 517; DC. Prodr. II (1825) 172; Ldb. Fl. Ross. I, 526; Boiss. Fl. Or. II, 45; Urban, Prodr. Mon. Medicago (1873) 54; Shmal'g., Fl. I, 226; Grossg., Obz.

Krym.-Kav. Medicago (1919) 17; Grossg., Fl. Kavk. II, 262. — Exs.: I. Dörfler, Herb. norm. No. 4227. — Ic.: Grossg. (1919) 16.

Perennial; rhizome stout, the numerous roots penetrating deep into the soil; stems numerous from woody base, slender, pubescent, pointing in various directions, sometimes flexuous, 10—25 cm long; leaflets appressed-pubescent, those of median leaves 5—6 mm long, narrowly linear-cuneate, with entire, often revolute margins, toothed from an apical notch and thus apparently 3-toothed at apex, those of lowermost leaves obovate; stipules very small, linear-subulate, entire or rarely toothed at base, pubescent; corolla 4—5 mm long, bright yellow or orange-yellow; standard broad, one and a half times to twice as long as keel and wings, these equal in length; calyx broadly turbinate-campanulate, rather faintly nerved, finely appressed-pubescent; teeth about as long as tube, unequal, subulate, acute, stellately spreading in fruit; pedicels slender, as long as or slightly longer than calyx; bracteoles very small, ovate-subulate; racemes rather numerous at ends of stems, loosely 2- or 3- or rarely 4-flowered; peduncle equaling subtending leaf; pod finely appressed-pubescent, 4 mm broad, reniform in a spiral of 1—1.5 turns, with slightly thickened outer margin, unarmed, the prominent veins spreading subradially from the inner margin and anastomosing about the middle of the surface; seeds 1 or 2, ovaloid, castaneous. May—June. (Plate X, Figure 12).

Calcareous rocky sites, bluffs and fissures among stones, in the lower mountain zone. — European part: Crim.; Caucasus: Cisc. (Taman Peninsula), W. Transc. (Gelendzhik). Endemic. Described from the Crimea. Type in Leningrad.

Note. M. rupestris cannot be recommended as forage.

Series 2. **Cancellatae** Grossh. — Pod spiraling through 2—3 turns, with flat faces, unarmed or with short prickles, glabrous or sparsely hairy, reticulate, the outer nerves more or less thickened.

3. **M. cancellata** M. B. Fl. taur.-cauc. II (1808) 226; Ldb. Fl. Ross. I, 526; Boiss. Fl. Or. II, 94; Urban, Prodr. Mon. Medicago (1873) 55; Shmal'g., Fl. I, 226. — M. ciscaucasica B. Fedtsch. in Not. syst. VIII (1940) 176. — Ic.: Fl. Yugo-Vost., No. 5, 571, Fig. 442.

Perennial; rhizome stout; roots penetrating deep into the soil; stems numerous from one rhizome, robust, erect, densely leafy, 15—25 (40) cm long; stipules very small subulate-linear, entire or rarely the lower 1- or 2-toothed at base; leaflets small, glabrous or slightly appressed-pubescent, those of lower leaves obovate, those of upper leaves linear-cuneate, prominently veined, retuse and apiculate; corolla 5.5—7 mm long, yellow; calyx-tube shorter to slightly longer than the teeth; pedicels slender, longer than calyx-tube; inflorescence capitate, densely 5—10-flowered; peduncle slender, almost filiform, equaling or exceeding the subtending leaf; pod glabrous, 4 mm in diameter, in a spiral of 2—3 turns, closed at center, lenticular, the outer margin strongly thickened, the prominent thick veins spreading subradially from the inner to the outer margin and intercepted about the middle by one or two concentric veins (Plate X, Figure 13).

Steppe and semidesert locations. — European part: L. Don, L. V.; Caucasus: Cisc. (Beshpagir). Endemic. Described from N. Caucasus. Type in Leningrad.

Note. Resemblance to M. prostrata and M. falcata suggests possible use as forage. Drought resistance is a particularly attractive feature. Even though M. cancellata as such is coarse, with scant foliage, and with some other undesirable features, it would be interesting to try it as a subject for hybridization with other species.

4. **M. saxatilis** M. B. Fl. taur.-cauc. II (1808) 225; Ldb. Fl. Ross. I, 528; Boiss. Fl. Or. II, 95; Urban, Prodr. Mon. Medicago (1873) 59; Shmal'g., Fl. I, 226; Grossg., Obz. Krym.-Kavk. Medicago (1919) 39. — Ic.: Grossg., l. c.

Perennial, with a strong and deep root system; stems slender, sulcate, sparingly appressed-hairy, 15—25 cm long, mostly much branched; stipules small, almost free, entire or the lower with 1 or 2 teeth at base, narrowly triangular-lanceolate, acute, sparingly appressed-hairy, prominently parallel-veined, often with 5—7 veins at base and 3 above; leaflets closely resembling those of M. falcata, 5—10 mm long, to 3 mm broad, narrowly obcuneate or sublinear, slightly dentate at summit, retuse and mucronate, prominently veined, green, sparsely covered with short appressed hairs; corolla 5—10 mm long, bright orange-yellow or stramineous; standard rather broad, exceeding keel and wings, these about equal; calyx campanulate, densely covered with white appressed hairs, prominently 5-nerved; teeth subulate-acuminate from triangular base, about twice as long as tube; pedicels very slender, shorter than calyx, densely appressed-hairy; bracteoles subulate, just reaching to scarcely exceeding half length of pedicel inflorescence capitate, densely 7—12-flowered; peduncle slender, firm, sulcate, overtopping the subtending leaf; pod 5—6 mm in diameter lenticular, in a spiral of 2—4 turns, flat, sparsely appressed-hairy or subglabrous, the margins of coils beset with short thick straight spines, the very prominent veins arising from ventral suture, reticulately anastomosing at the middle of the coil and usually terminating in a spine. May—June. (Plate XI, Figure 6).

Dry rocky slopes in the middle mountain zone. — European part: Crim. Endemic. Described from the Crimea. Type in Leningrad.

139 Note. The coloring of M. saxatilis is very reminiscent of the dwarf forms of M. falcata. There is no doubt that M. saxatilis may be of interest for trials, but it is important to conduct detailed field observations with a view to obtaining more information than we possess at present.

Series 3. **Brachycarpae** Grossh. — Pod not coiled, straight or falcate or lunate, unarmed, glabrous or hairy.

Note. The distribution of the various species previously combined under the name M. falcata provides striking manifestation of ecological and geographical factors. M. borealis is the most northerly and most mesophilic race of this series. M. falcata is associated with nemoral areas of Europe and the South Siberian taiga region; this is also a mesophilic, predominantly meadow form, confined in the steppe region to intrazonal meadow habitats. M. stepposa is associated with steppe, Mediterranean, and semidesert areas of Europe and Asia; this is a xerophilic steppe form which may grow outside the steppe belt in more xerophilic intrazonal conditions. The morphological features of each species correspond fully with their ecology (see description). Both types, the mesophilic M. falcata and the xerophilic M. stepposa, occur in the mountains along the southern periphery of the USSR, each growing in appropriate conditions. The numerous varieties described here do not by any means exhaust the range of variability of these two species, and it is in the mountains of the South, where the variability is greatest, that it has received the least amount of study. The varieties recorded are probably not equivalent from the systematic point of view; some (e.g., M. stepposa var. angustifolia) represent the most xerophilic geographic strain, as yet incompletely formed, while others appear to be incidentals without definite distribution area. Since each of the varieties here described may have its own forage potentialities which may manifest themselves in cultivation in different ways, it is important to record the information so far available concerning the variability of the series Falcatae.

The Linnaean diagnosis of M. falcata, notwithstanding its brevity, contains two characters (ascending stems and lunate pods) which justify the assumption that Linnaeus described the mesophilic meadow form of yellow lucerne, and the Linnaean appellation should therefore be retained for this form.

5. **M. borealis** Grossh. sp. nova in Addenda X, p. 291.

Perennial; stems numerous, usually ascending, rarely erect, 40–60 (80) cm long, glabrous as are the leaves; stipules connate to one-third or half their length, the free part lanceolate, toothed; leaflets 10–25 mm long, thin, obovate to oblong-obovate, dentate in upper part; inflorescence rather loose, 10–25-flowered; peduncle exceeding the subtending leaf; pedicels slender, shorter than calyx; calyx tubular-infundibular, the linear-subulate acute teeth longer than tube; corolla pale yellow; pods numerous, on pendulous stipes, lunate, glabrous, many-seeded, bulging about the seeds. June–July.

Water meadows. — European part: Lad.-Ilm., U. V., V.-Kama, Transv., Balt., U. Dnp.; W. Siberia: U. Tob. **Gen. distr.**: N. Europe (?). Type in Leningrad.

Within this species may be distinguished var. micrantha Vass., with corolla not more than 6–7 mm long (as against 8–10 mm in typical M. borealis) and occurring inside the distribution area of the species, though mostly in the NW regions of the European part of the USSR.

6. **M. falcata** L. Sp. pl. (1753) 779; Ldb. Fl. Ross. I, 524; Boiss. Fl. Or. II, 93; Shmal'g., Fl. I, 225, p. p.; Grossg., Fl. Kavk. II, 260, p. p. — M. falcata var. adscendens Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. 1–2 (1932) 10; Kryl., Fl. Zap. Sib. VII, 1590.

Perennial; stems numerous, erect or ascending, 40–60 (80) cm long, glabrous or slightly pubescent as are the leaves; stipules connate to one-third or to the middle, the free part lanceolate, entire or more or less toothed; leaflets (4) 10–20 (30) mm long, obovate to oblong, always narrowing toward base, the margin dentate from the middle upward; peduncle exceeding the subtending leaf; bracteoles membranous, equaling or shorter than pedicel; inflorescence dense, 20–30-flowered; calyx tubular-infundibular, the linear-subulate teeth longer than tube; corolla (6) 7–10 mm long, sulfureous, rarely lemon-yellow, never blue or violet; pods borne on erect stipe, lunate (i.e., spiraling through half to full turn), glabrous or slightly hairy. June–July. (Plate X, Figure 4).

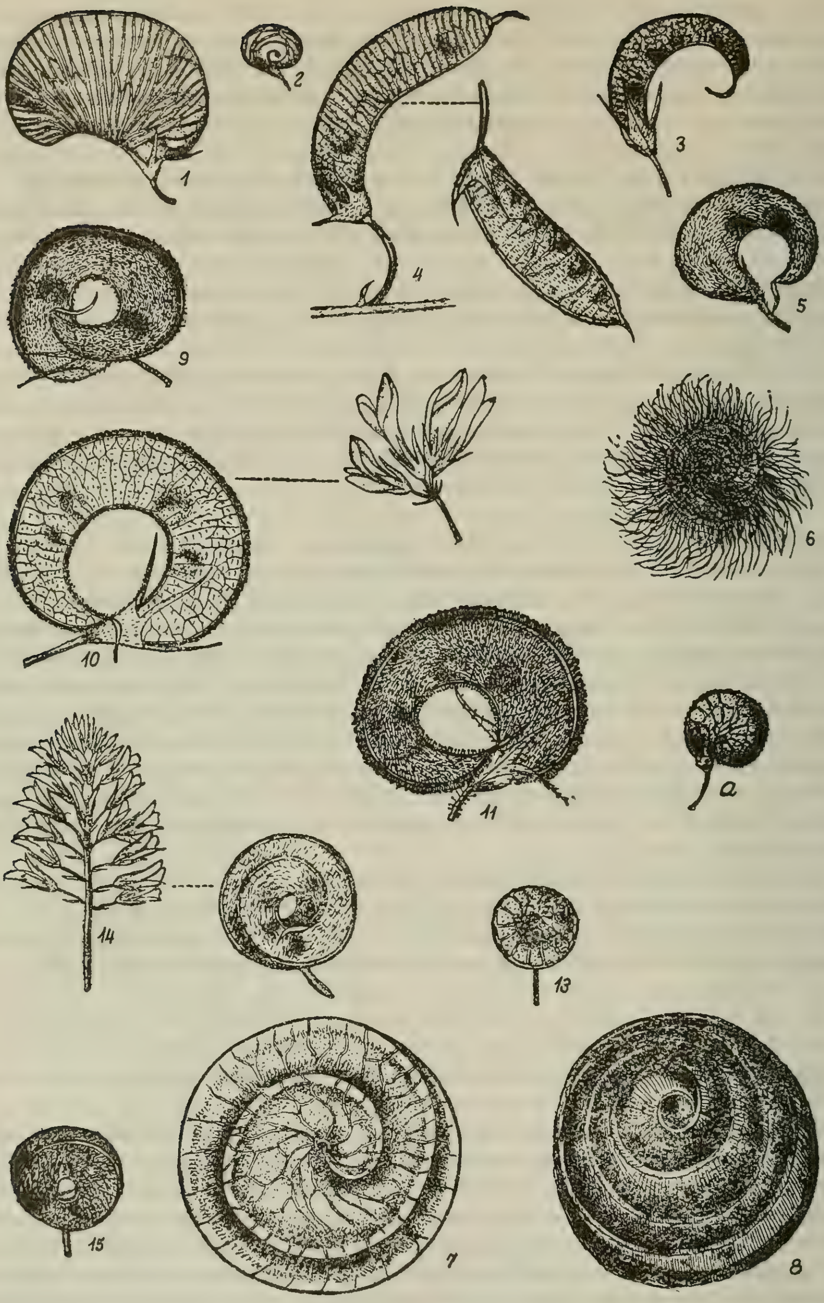

PLATE X. 1 — Medicago falcata var. cretacea Grossh.; 2 — M. lupulina L.; 3 — M. trautvetteri Sumn.; 4 — M. falcata L.; 5 — M. hemicycla Grossh.; 6 — M. lanigera Winkl. et B. Fedtsch.; 7 — M. orbicularis (L.) All.; 8 — M. scutellata (L.) All.; 9 — M. polychroa Grossh.; 10 — M. virescens Grossh.; 11 — M. glutinosa M.B.; 12 — M. rupestris M.B.; 13 — M. cancellata M.B.; 14 — M. sativa L.; 15 — M. schischkinii Sumn.

Water meadows, dry meadows, grassy slopes, and wood margins; sometimes a weed. — European part: Lad.-Ilm., U.V., V.-Kama, V.-Don, Transv., L.Don, Balt., U.Dnp., M.Dnp., U.Dns., Bl., Bes., Crim.; Caucasus: Cisc., W.Transc.; W.Siberia: U.Tob., Irt., Alt.; E.Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Uss.; Centr.Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T.Sh., Syr D. **Gen.distr.**: Atl. and Centr.Eur., W. and E.Med. Described from SW Europe. Type in London.

3 Var. 1. **altissima** Grossh. — Stems to 100—120 cm long, with few long mostly obliquely ascending branches, glabrous or sparsely hairy as are the leaves; leaflets oblong to oblong-linear, 15—25 mm long and 4—7 mm broad; stipules lanceolate, sparingly toothed; racemes loose, slightly elongated; flowers yellow; pod falcate, glabrous.

Glades, watered meadows, and wood margins, up to 1,800 m. — European part: Crim.; Caucasus: Cisc.

Var. 2. **lasiagrostidetorum** Vass. var. n. — Stems 80—100 cm long; leaflets 12—20 (25) mm long and 3—5 (8) mm broad; racemes elongated; flowering and fruiting very profusely; pods falcate. — Centr. Asia: "Chievniki" of E. Tien Shan.

Var. 3. **tenella** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1—2 (1932) 10; Kryl., Fl. Zap. Sib. VII (1933) 1592. — Stems numerous from a stringy rhizome, slender, ascending, 50 cm long, covered above with ferruginous hairs; leaflets broadly linear, 12—20 mm long and 1—3 mm broad, sparingly toothed at summit, profusely appressed hairy, more densely beneath; peduncle to twice as long as the leaf; calyx teeth about twice as long as tube.

Inundated meadows. — Centr. Asia: Balkh.

Var. 4. **sophiae** (Bosse) Grossh. var. n. — M. falcata var. sophiae Bosse in sched. (1885). — Stems procumbent, ascending, divaricately much branched, the branches densely leafy; leaflets filiform, toothed at summit or mucronulate from apical notch, pubescent; racemes few, loose, lateral ones numerous, 2—5-flowered; flowers very small, yellow; pod falcate.

Habitat conditions unknown. — European part: Bes., Bl.

Var. 5. **foliosa** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk., No. 1—2 (1932) 12. — Stems 50—60 cm long, densely and profusely leafy; leaflets stiffish, cuneate-ovate, 8—10 mm long and 2—3 mm broad; pod falcate. — W. Siberia: U. Tob.

Var. 6. **revoluta** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1—2 (1932) 12; Kryl., Fl. Zap. Sib. VII (1933) 1593. — Rhizome stout, multicipital; stems ascending, 10—40 cm long; leaflets linear-cuneate, densely covered with short subpatulous hairs, 8—12 mm long and 1—1.5 mm broad, denticulate at summit; pod subfalcate, 10—12 mm long, recurved in upper part.

Slopes and plowfields. — W. Siberia: Irt., Alt.

Var. 7. **ramosissima** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 13. – Canescent, profusely branched from base, 30–40 cm high; stems ascending; leaflets flat or more or less conduplicate, oval to oval-subulate, toothed to the middle with small strong teeth, 12–14 mm long 144 and 2–5 mm broad, glabrous above, appressed-hairy beneath; racemes rather short, capitate; peduncle equaling the leaf; pod falcate, 10 mm long and 3 mm broad, with appressed white hairs.

Dry meadows. – W. Mongolia.

Var. 8. **tarbagataica** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 9. – Rhizome stout, to 1.5 cm in diameter; stems numerous, herbaceous, 15–30 cm long, branches from the very base; leaflets ovate, narrowing toward base, sharp-dentate in upper part, 9–12 mm long and 2–4 mm broad, flat, grayish beneath with appressed hairs; pod falcate, 10 mm long, rather densely appressed-hairy.

Stony places. – Centr. Asia: Dzu.-Tarb.

Var. 9. **lignescens** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 9. – Stems woody in lower part, trailing, with ascending branches; leaflets cuneate, 4–10 mm long and 2–3 mm broad, toothed only at apex, glabrous above, appressed-hairy beneath; peduncle two to three times length of leaf; pod falcate, 10–12 mm long and 2 mm broad.

Habitat conditions unknown. – Centr. Asia: T. Sh.

Var. 10. **pygmaea** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 12; Kryl., Fl. Zap. Sib. VII (1933) 1593. – Stems 20–23 mm long, decumbent, herbaceous; leaflets cuneate to oval-cuneate, glabrate, 5–11 mm long and 1–4 mm broad, denticulate at apex; pod falcate, to 15 mm long, covered with appressed white hairs.

Riverine pebble deposits. – W. Siberia: Irt., Alt.

Var. 11. **kuhartica** Vass. var. n. – Stems 40–60 cm long, glabrous or nearly so; leaflets 10–20 mm long and 3–5 mm broad; peduncle exceeding the leaf; corolla pale yellow, 8–10 mm long; pod falcate to almost annular, glabrous, thin-walled, often coiled.

Centr. Asia: T. Sh. (Kugart Pass).

Note. This variety may possibly be a hybrid (M. tianschanica × M. falcata).

Var. 12. **altaica** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 13; Kryl., Fl. Zap. Sib. VII, 1593. – Stems erect, 5–14 cm long; leaflets cuneate, toothed to one-quarter or rarely to the middle, almost smooth, 4–5 mm long and 1.5–2 mm broad; pod falcate, 8–10 mm long, sparsely appressed-hairy.

Stony mountain slopes. – W. Siberia: Alt.

Var. 13. **mongholica** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. N. 1–2 (1932) 13. – Stems ascending, densely leafy, ca. 70 cm long; leaflets 145 oval-cuneate or oblong-obovate, cuneate at base, 16–23 mm long and 4–8 mm broad, the margin cut to about the middle into rather long sharp teeth; peduncles equaling leaves; racemes many-flowered; pod straight, 10–15 mm long and 4 mm broad, rather densely covered with appressed white hairs.

Steppe meadows. — NW Mongolia.

Var. 14. **orientalis** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1—2 (1932) 11; Kryl., Fl. Zap. Sib. VII (1933) 1592. — Profusely branched, 30—50 cm high; leaflets ovate-oval or broadly obovate, cuneate at base, 7—20 mm long and 5—10 mm broad, glabrous above, sparsely appressed-hairy beneath; bracteoles one-quarter to one-third length of pedicel; pedicels ca. 9 mm long; standard 6 mm broad.

Meadows. — W. Siberia: Alt.

Var. 15. **cretacea** Grossh. var. n. — M. falcata L. var. latifolia Grossh. in A. Grossg., Obz. Krym.-Kavk. Medicago (1919) 20; A. Grossg., Fl. Kavk. II (1930) 260. — Stems robust, 40—50 cm long, slightly divaricate-branched in upper part, glabrous or sparingly hairy as are the leaves; leaflets stiff, glaucescent, obovate-cuneate, 7—18 mm long and 5—10 mm broad, finely denticulate in upper part; racemes loose, ovoid; flowers yellow; pod falcate. (Plate X, Figure 1).

Gravelly slopes and rocks in the lower mountain zone. — European part: Bl., Bes., Crim.; Caucasus: W. Transc.

Var. 16. **parviflora** Grossh. — M. falcata var. parviflora in sched. — Stems branched, hairy; racemes, flowers, and fruits as in var. typica; leaflets 3—4 mm long and 2—3 mm broad, oblong-obovate.

Habitat conditions unknown. — Centr. Asia: Balkh.

Var. 17. **suffruticosa** Grossh., Obz. Krym.-Kavk. Medicago (1919) 21; Grossg., Fl. Kavk. II, 260. — Rhizome stout, branched, penetrating deep into the soil; stems numerous, apparently appressed to each other, ascending to pendulous, woody at base, 10—15 (30) cm long; leaves numerous, especially on lower part of stem; leaflets flat, 5—8 mm long and 3—4 mm broad, obovate, toothed at apex, sparingly hairy; racemes rather dense; flowers bright yellow; pod slightly curved, sometimes almost straight, thickish, glabrous.

Rocky places up to 1,300 m. — Caucasus: Cisc.

Var. 18. **pubescens** Rouy et Foucaud, Fl. Fr. V (1899) 11. — Leaves and stems slightly appressed-hairy; pod densely covered with simple flexuous hairs and apparently hoary by rather profuse white tubercles.

Chernozem steppes and sands. — European part: Bl., Crim.

7. **M. romanica** Prod. Fl. Rom. I (1900) 617. — M. falcata Ldb. Fl. Ross. I (1842) 524 p. p.; Boiss. Fl. Or. II, 93 p. p.; Shmal'g., Fl. I, 225 p. p.; Grossg., Fl. Kavk. II, 260 p. p. — M. falcata var. typica Trautv. ex Sumnevich in Kryl., Fl. Zap. Sib. VII, 1590 p. p.

Perennial; stems numerous, erect, very rarely somewhat ascending, 30—50 (70) cm long, branched, pubescent as are the leaves; stipules connate to one-third or one-half, the free part lanceolate, entire or slightly toothed; leaflets (4) 10—20 (30) mm long, oblanceolate-linear to linear, attenuate toward base, dentate above the middle, flat or revolute-margined; peduncle exceeding the subtending leaf; bracts very small, membranous, equaling or shorter than pedicel; inflorescence usually compact, densely 20–30-flowered calyx tubular-infundibular, the linear-subulate teeth longer than tube; corolla (6) 7–10 mm long, bright yellow or sulfureous, sometimes almost orange, never violet or blue; pods on an erect stipe, straight or slightly falcate, coiled through less than half a turn, more or less hairy, rarely glabrate. June–July.

Chernozem steppes, sandy places, dry turfy slopes, wood margins, and scrub. – European part: M. V., V.-Kama, (rare), V.-Don, Transv., L. Don, L. V., U.-Dnp., M. Dnp., U. Dns., Bl., Bes., Crim.; Caucasus: Cisc., W., E. (rare) and S. Transc., Dag.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (rare); Far East: Ze.-Bu. (rare); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Syr D., Pam.-Al., Mtn. Turkm. (rare). Described from Dobruja.

European part: M. Dnp., U. Dnp., Bl.

Var. 1. **erecta** Kotov. – M. falcata ssp. erecta Kotov in Priroda No. 1 (1935) 70. – Plants erect, to 120 cm high; stems woody at base; leaflets linear, 1–2 cm long and 5–6 mm broad, densely pubescent; pod straight, 6–9 mm long, appressed-pubescent.

Coastal belt of the Black and Azov seas, on shell and pebble sands. – European part: Bl.

Var. 2. **sibirica** (Sumn.) Grossh. – M. falcata var. sibirica Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 11; Kryl., Fl. Zap. Sib. VII (1933) 1593. – Much branched, to 60 cm high; leaflets oval-cuneate or linear-cuneate, flat or partly conduplicate, dentate in upper part, ca. 10 mm long and 1–3 mm broad; bracteoles one-third to half length of pedicel; pod straight, whitish with closely appressed pubescence.

Steppes. – W. Siberia: U. Tob., Irt.

Var. 3. **ferruginea** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 10; Kryl., Fl. Zap. Sib. VII (1933) 1592. – Ferruginous-hairy in upper part; stems long, erect; leaflets oval-cuneate or subulate, 10–16 mm long and 2–5 mm broad, denticulate in upper third; inflorescence capitate; pod straight.

147 Steppes, dry glades; a weed of vegetable crops. – W. Siberia: Alt.; Centr. Asia: Balkh., Dzu.-Tarb.

Var. 4. **linifolia** (Kushan) Grossh. – M. falcata var. linifolia Kushan in Schedis. – Stems 50–70 cm long; leaflets 20–30 mm long and 2–3 mm broad, flat, glabrate, entire or at apex slightly denticulate, often tapering toward apex and acutish; racemes dense; flowers yellow; pod falcate.

Habitat conditions unknown. – European part: L. Don, Bl.; W. Siberia: Alt.

Var. 5. **angustifolia** (Ptasch.) Grossh. – M. falcata var. angustifoli Ptaschitzky in schedis. – Stems numerous, erect, 40–60 cm long, often robust, branched; stipules semisagittate, entire, rarely slightly toothed; leaflets very narrow, linear to cuneate-linear, 1–2 mm broad, revolute-margined, pubescent; racemes dense; flowers yellow or pale yellow; pod falcate, more or less pubescent.

Dry and desert steppes, dry grassy mountain slopes. — European part: V.-Don, Transv., Bl., Crim.; Caucasus: Cisc., E. Transc. (rare); W. Siberia: U. Tob., Irt.; Centr. Asia; Ar.-Casp., Balkh.

Var. 6. **hirsuta** (Trautv.) Grossh. — M. sativa var. hirsuta Trautv. in sched.; Kryl., Fl. Zap. Sib. VII, 1592. — Stems, branching, racemes, and flowers as in var. stepposa; plant densely short-hairy throughout, eglandular; leaflets narrowly linear, the margins often revolute; pod falcate, pubescent.

Chernozem and wormwood steppes. — European part: U. Dns., Bl., L. Don, L. V, Crim.; W. Siberia: U. Tob., Irt., Alt.

Var. 7. **lanata** Grossh. — Stems, branching, leaves, racemes, and flowers as in var. stepposa; leaflets narrow; plant densely shaggy with short spreading white hairs; pod densely pubescent.

Wormwood steppes. — European part: L. V. (Urals).

Var. 8. **viscosa** Rchb. Fl. Germ. excurs. (1831) 504; Grossg., Obz. Krym.-Kavk. Medicago (1919) 21; Grossg., Fl. Kavk. II, 260. — Stems and leaves densely appressed-hairy; pod falcate, densely hairy; indument consisting throughout (including the whole inflorescence region) of simple hairs as well as rather numerous stalked glandular hairs.

Calcareous slopes, dry hills, wood margins, thickets, etc. — European part: Crim.; Caucasus: Cisc., W. and E. Transc. (Georgia?).

Note. The feed value of the group of species designated as M. falcata is widely known. It is a cultivated plant of very long standing and its properties have been fully discussed in the specialized literature.

We are concerned here with the prospects of field trials directed toward introduction into cultivation of the numerous wild forms of this group that have been mentioned above.

It is quite clear that M. borealis, being endowed with excellent morphological properties, should play a significant role in the northern regions of the USSR. The same may be said about M. falcata s.l., which is characterized by profuse and large leaflets; this fact, combined with the possibility of cultivation in remote northern areas (Yakutsk), should be of the greatest interest to agronomists.

The classical, i.e., the "typical" form of the species has been so long in cultivation that there is no need to discuss its attributes as forage. M. romanica promises to be of value for practical exploitation in extremely arid regions. The numerous mesozonal modifications of M. falcata point to the possibility of utilizing purely local habitat conditions to which cultivation of this species has not so far been adapted. Of particular interest is var. altissima, indigenous in N. Caucasus, which literally begs to be put into cultivation; it may be safely predicted that in this case trials would be fully successful. Of somewhat less interest are the xeromorphic adaptations of M. romanica, since the xeromorphic structure as such is not a desirable property. But, on the other hand, the xeromorphic forms display considerable drought-resistance and open up the possibility of unirrigated cultivation of M. romanica under conditions of the arid southern regions of the USSR, and as such may prove to be useful and profitable in certain regions even with modest performance. We are convinced that all these southern forms should be subjected to introduction, improvement, hybridization with other forms, etc. Species of the M. falcata group may play an important role in helping to solve the acute problem of intensifying agricultural production in the southern regions of the USSR.

Series 4. **Vulgares** Grossh. — Pod in a spiral of 1—4 turns, rarely but half a turn (M. trautvetteri), the more or less flat surface without a prominent network of veins, unarmed, glabrous or more or less pubescent.

8. **M. sativa** L. Sp. pl. (1753) 178; Ldb. Fl. Ross. I, 525; Boiss. Fl. Or. II, 94; Shmal'g., Fl. I, 225; Grossg., Fl. Kavk. II, 263; Kryl., Fl. Zap. Sib. VII, 1594. — M. sativa L. var. grandiflora and var. parviflora Grossh., Obz. Krym.-Kav. Medicago (1919) 28. — Ic.: Grossg. (1919) 29; Fl. Tadzhik. V, Plate 13., Fig. 4.

149 Perennial; rhizome stout, penetrating deep into the soil; stems 4-angled, glabrous or in upper part hairy, profusely branched in upper part, 40—80 cm long, forming an upright or expanded bushy plant or decumbent; stipules united to one-third or half their length, the free portion triangular-lanceolate, taper-pointed, at base entire or mostly with 1 or 2 teeth, glabrous or sparingly appressed-hairy, with longitudinal veins; leaflets oblong-oval, ovate or linear, tapering toward base, crenate above the middle, mostly retuse and mucronate, (5) 10—25 (45) mm long and 3—10 mm broad, glabrate or appressed-hairy, paler green beneath; corolla 6—15 mm long, ranging in color from pale yellow to blue and blackish violet; calyx tubular-infundibular, the linear-subulate teeth longer than tube, mostly appressed-hairy; pedicels slender, shorter than or equaling calyx-tube; bracteoles whitish, linear-subulate, long-acuminate, mostly equaling the pedicel; inflorescence an abbreviated raceme, oval or round in outline, rarely somewhat elongated, 1—2.5 cm long, 1—2 cm broad, 5—30 (40)-flowered; peduncle slender, rather firm, always exceeding the subtending leaf, glabrous or appressed-hairy as are rachis and pedicels; pod spiraling through 2—4 tightly closed coils, 3—9 mm in diameter, prominently reticulate-veined, glabrous or appressed-pubescent; seeds irregularly ovaloid or irregularly cordate, castaneous. May—July. (Plate X, Figure 14).

Dry meadows, grassy slopes, taluses, steppes, wood margins, scrub, riverine pebbles, pastures, and as weed in and around fields. — European part: Lad.-Ilm., U. V., V.-Kama, V.-Don, Transv., L. V., L. Don, Balt., U. Dnp., M. Dnp., U. Dns., Bl., Crim.; Caucasus: Cisc., W., E., and S. Transc., Dag.; W. Siberia: U. Tob., Irt.; Far East: Uss.; Centr. Asia: Ar.-Casp., Mtn. Turkm., Pam.-Al. **Gen. distr.**: Bal.-As. Min. (wild), cultivated and a weed throughout Europe, Asia, and America. Described from Spain and France. Type in London.

Note. The forage value of M. sativa is universally known. Analysis of the distribution range and habitats of wild alfalfa indicates that the potentialities of the species are far from having been fully exploited in cultivation. As already pointed out, there is no doubt that alfalfa cultivation could be pushed considerably northward as well as to higher altitudes in the mountains, well beyond its present limits. Similarly, much more arid locations could be put down to alfalfa. The most important aim for practical work with M. sativa is the production of a form for nonirrigated cultivation of this species.

The chemical composition and food value of cultivated strains of M. sativa are well known. As regards wild-growing M. sativa, information in this respect is very limited. Some data have been obtained in recent years from Transcaucasia and Kazakhstan.

Analysis of wild Transcaucasian M. sativa yields the following percent composition per 100 g of oven-dried material: crude protein 17.76, crude fat 1.93, crude cellulose 29.24, total ash 15.32, nitrogen-free extract 35.75, nitrogen 2.841.

M. sativa from Kazakhstan yielded the following results:

	In % of air-dry matter	In % of oven-dry matter
Hygroscopic water	7.3	16.5
Ash	9.06 – 7.77	8.0 – 9.58
Cellulose	17.45 – 18.83	29.5 – 35.33
Crude protein	17.10 – 18.44	14.2 – 17.0
Pure protein	13.49 – 14.56	
Crude fat	3.03 – 3.27	2.6 – 3.11
Nitrogen-free extract	46.12 – 49.69	29.2 – 34.97

9. **M. coerulea** Less. (in herb. reg. berol) ex Ldb. Fl. Ross. I (1842) 526. – M. coerulea var. vulgaris Grossh., Obz. Krym.-Kavk. Medicago (1919) 32; Grossg., Fl. Kavk. II, 264. – M. sativa subsp. β M. coerulea Shmal'g., Fl. 1 (1895) 226. – Ic.: Grossg., Obz. Krym.-Kavk. Medicago (1919) 33; P. V. Kislyakov, k voprosu o kormovykh rasteniyakh Apsherona [The Problem of Forage Plants in the Apsheron Peninsula] in Tr. po prikl. bot., gen. i sel., Vol. XVII, No. 4 (1927) 244. – Exs.: Pl. Or. exsicc. No. 308 (1928).

Perennial, 50–70 (100) cm high; rhizome often strong, vertical, penetrating deep into the soil; stems angled, glabrous or sparsely appressed-hairy, slender, profusely branched especially in upper part; branches erect or obliquely ascending; stipules united to one-third or half their length, the free part triangular-lanceolate, acutely subulate-elongate, with entire margins; leaflets narrowly linear-cuneate, often almost linear, occasionally suboval, 7–25 mm long, in upper part with a few teeth of which the uppermost apical, rarely obscurely emarginate at apex; leaflets glabrate above, more or less appressed-hairy beneath; corolla 5–6 (8) mm long, blue or bluish violet; calyx tubular-infundibular, glabrous, rarely appressed-hairy, the lance-subulate straight teeth as long as or slightly longer than tube; pedicels slender, mostly glabrous, rarely appressed-hairy; bracteoles lance-subulate, shorter than pedicel; inflorescence elongate-oblong, densely 9–40-flowered, 1.4–4.5 cm long and 8–10 mm broad; peduncle slender, much longer than the subtending leaf; inflorescence branches and pedicels glabrous or appressed-hairy; pod spiraling through 2–3 tightly closed coils, 2–3 (rarely 4–5) mm in diameter, glabrous or rarely appressed-pubescent, prominently reticulate-veined. June–October. (Plate XI, Figure 3).

Semideserts, dry slopes, ditch borders, sandy seashores, etc. – European part: Transv., L. V., Crim.; Caucasus: Cisc., W. Transc. (rare), E. and S. Transc. (rare), Dag.; Centr. Asia: Ar.-Casp., Balkh., T. Sh., Syr D., Mtn. Turkm. (rare). **Gen. distr.**: probably occurring in Asia Minor and Iran. Described from the Lower Volga. Type in Leningrad.

Var. 1. **melilotoides** Grossh., Obz. Krym.-Kavk. Medicago (1919) 32; Grossg., Fl. Kavk. II, 264. — Pods with 2—3 coils, shorter than the calyx teeth, 2—3 mm in diameter, appressed-pubescent; corolla 7—8 mm long, yellowish white or almost white; racemes many-flowered, 5—6 cm long, the peduncle much longer than the subtending leaf; leaflets cuneate; stems long, 4-angled, few-branched.

Caucasus: E. Transc. (Kakhetia).

Var. 2. **hemicoerulea** (Sinskaja) Grossh. — M. hemicoerulea Sinskaja in Bot. Zhurn. SSSR, XXIII, No. 4 (1938) 327. — Pods 4—6 mm in diameter, more loosely coiled; stems slender, leafy; leaves dark green. — Caucasus: Dag., in the middle mountain zone, at altitudes about 1,000 m on the Caspian slope of the Dagestan mountains.

Var. 3. **pallida** Grossh., var. n. — Inflorescence few-flowered, loose, subumbellate, sometimes depauperate with 1 or 2 flowers; flowers pale yellow; leaflets very narrow, almost filiform; stems 30—40 cm long, slender, profusely branched.

Feathergrass and mixed grass steppes. — Centr. Asia: Ar.-Casp.

Var. 4. **pauciflora** (Ldb.) Grossh. — M. pauciflora Ldb. Fl. Ross. I (1842) 526. — Strongly lignified at base; leaflets narrowly linear-cuneate; racemes 2—4-flowered. — Caucasus: E. Transc.

Note. The most xerophytic type of M. coerulea; growing in dry farming areas as a component of semidesert vegetation in stony places and occurring rather rarely; of no interest as forage.

Note. The biological properties of M. coerulea are extremely interesting. This species is probably destined to play an important role in nonirrigated agriculture of our arid areas. I pointed this out as far back as 1919, but it was only in about 1927 that the Azerbaijan section of the Plant Production Institute (in Mardakyani on the Apsheron Peninsula) initiated experimental work on this plant. This beginning concerning such an important subject is certainly to be welcomed. The only publication on this topic, by P. Kislyakov, "K voprosu o kormovykh rasteniyakh Apsherona" [The Problem of Forage Plants in the Apsheron Peninsula] (Tr. po prikl. bot., gen. i sel., Vol. XVII, No. 4 (1927) 235), indicates the variability of wild-growing forms of M. coerulea (such as erect and prostrate), somewhat reminiscent of a similar situation as described above for M. sativa. Kislyakov puts down the occurrence of prostrate forms to the effect of grazing.

The percent composition of Transcaucasian plants of M. coerulea for 100 g air-dry samples was as follows: crude protein 13.41, crude fat 1.58, crude cellulose 31.97, total ash 8.47, nitrogen-free extract 32.99, nitrogen 152 2.145. The analysis refers to plants at flowering time. There is less protein and more cellulose than in the case of M. sativa, but it should be noted that the values for M. sativa are also subject to fluctuation. Thus, M. coerulea is not much less nutritious or rougher than M. sativa. However, with results of but one analysis available, this conclusion can only be regarded as preliminary.

10. **M. trautvetteri** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk., No. 1–2 (1932) 3; Kryl., Fl. Zap. Sib. VII, 1593. – M. falcata var. ambigua Trautv. Enum. Pl. (1860) 474.

Perennial; stems erect, 40–80 cm long, much branched; stipules united to one-third, the free portion narrowly lance-linear, acuminate, entire, more or less appressed-pubescent; leaflets (5) 8–10 mm long, (1.5) 2–3 mm broad, oblong-obcuneate, appressed-pubescent beneath, mucronate, with or without an apical notch, on lateral branchlets much shorter and narrower; corolla 5–7 mm long, dark violet, rarely lighter; standard narrow; calyx shortly turbinate-campanulate, prominently nerved, appressed-pubescent, the subulate-lanceolate acuminate teeth twice as long as tube; pedicels slender, as long as or mostly shorter than calyx; bracteoles very small, subulate, much shorter than pedicel; inflorescence oblong, elongate, rather dense, to 2 cm long, many-flowered; peduncle exceeding the subtending leaf; pod falcate, blackish in maturity, rarely reticulately tuberculate-rugulose, glabrous, 5–9 mm long, never coiled through a complete turn; seeds few, light brown, elongate-reniform, rounded, smooth. June–July. (Plate X, Figure 3).

Dry steppes, semideserts, and chalky slopes. – European part: Transv. (Chkalov [Orenburg]); W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh., T. Sh (rare). Endemic. Described from Kazakhstan. Type in Leningrad.

Note. The various characters of M. trautvetteri point to definite forage attributes and I assume that this plant is destined to play an important role in future development on nonirrigated forage production schemes.

Series 5. **Hemicyclae** Grossh. – Pod with 1–1.5 coils or lunate, of medium size, eglandular.

11. **M. schischkinii** Sumn. in Animadv. Syst. ex Herb. Univ. Tomsk. No. 1–2 (1932) 5. – Ic.: Sumnevich, ibid. 15.

Perennial, with a stout multicipital rhizome; stems 25–50 cm long, suberect, short-branched; stipules 6–10 mm long, lanceolate or broadly linear, united to one-third with petiole, entire or with 2 or 3 very small broadly triangular teeth; leaflets cuneate or oval, 2–10 mm long and 2–5 mm broad, mucronulate from retuse apex, glabrate and slightly wrinkled above, densely appressed-hairy beneath; peduncle much longer than leaf; raceme 1–3 cm long; flowers sulfureous, 7–10 mm long; standard broad-oval or ovate, shallowly emarginate at apex, to 4–5 mm broad; calyx 4–5 mm long, the linear-lanceolate teeth about as long as tube; pod 4–5 mm in diameter, with 1–2 coils, reticulate-veined, grayish by long appressed flexuous hairs. June–July. (Plate X, Figure 15).

Dry steppe slopes. – Centr. Asia: Balkh. **Gen. distr.:** Mong. Described from [the former] Semireche Region. Type in Tomsk; cotype in Leningrad.

12. **M. tianschanica** Vass. in Bot. Zhurn. SSSR, XXV, 3 (1940) 244, in nota. – Ic.: ibid. 248.

Perennial; stems numerous, 40–80 cm long, branched, erect or rarely ascending, more or less appressed-hairy as are the leaves; stipules in free portion lanceolate, the margin sharply 3–5-toothed; leaflets green, (13) 15–20 mm long and 3–4 (to 9) mm broad, obovate-oblong or oblanceolate, dentate in upper part; inflorescence ovaloid, dense, many-flowered; bracteoles subulate, equaling or slightly shorter than pedicel; calyx-teeth longer than tube, this more or less hairy in upper part; corolla varying in color, white, yellow, lilac, pink, blue, green, voilet, purple, etc. (but not red); pod with 1—1.5 coils, 4—5 mm in diameter, appressed-puberulent. June—July.

The wood and scrub zone and wheatgrass-mixed grass steppe associations. Centr. Asia: Pam.-Al., Syr D., T. Sh., Dzu.-Tarb. **Gen. distr.**: probably occurring in Dzu.-Kash. Described from the Aksu-Dzhebogly State Reserve. Type in Leningrad.

The following varieties of this species have been distinguished:

Var. 1. **oblonga** Vass.— Leaflets oblong, (10) 12—20 (25) mm long and 3—5 mm broad.

W. Tien Shan, on melkozem slopes and water divides in the wood and scrub zone.

Var. 2. **fruticetorum** Vass.— Leaflets 15—25 mm long and 5—10 mm broad; calyx teeth as long as tube; stems erect, 100—125 cm long.

As above, in the scrub.

Var. 3. **obovata** Vass.— Leaflets obovate, 8—12 mm long and 4—7 mm broad, calyx-teeth as long as tube; stems to 50 cm long.

As above, in fallows and cultivated fields.

Var. 4. **saxatilis** Vass.— Leaflets abundant, 5—10 mm long and 2—3 mm broad; corolla 7—7.5 mm long.

As above, among stones in valleys and on slopes.

Var. 5. **riparia** Vass.— Stems decumbent, trailing; leaflets 8—15 mm
154 long and 2—7 mm broad; calyx-teeth longer than tube.

As above, banks of rivers and irrigation ditches.

Var. 6. **agropyretorum** Vass.— Stems 50—100 cm long; leaflets 10—20 mm long and 2—7 mm broad; corolla 6—7 mm long; pod 3—4 mm in diameter, with 1.5—2.5 coils (possibly a distinct species).

Feathergrass-mixed grass steppes in W. Tien Shan.

13. **M. hemicycla** Grossh. Novye dannye k poznaniyu kavkazskikh lyutsern [New Data Supplementing the Knowledge of Caucasian Medicks] in Zap. Nauchno-Prikl. otd. Tifl. Sada, No. IV (1925) 147; Grossg., Fl. Kavk. II, 262.— M. varia Grossh., Obz. Kr.-Kavk. Medicago (1919) 22, p. p. quoad sp. transc., non Martyn.— M. falcata Somm. et Lev. in A. H. P. XVI (1900) 111.— Ic.: N. Troitskii, Tr. po prikl. bot., gen. i sel. XIX, No. 2 (1928) 216.

Perennial; rhizome stout, deep; stem glabrous or hairy above, usually much branched, 40—50 cm long, erect or mostly decumbent, weak; stipules united to one-third or to the middle, triangular-lanceolate, elongate-pointed, entire or with 1 or 2 teeth at base, mostly glabrous; leaflets oblong-oval, rarely ovate or oblong-linear, attenuate toward base, crenate above the middle, often notched at apex, 10—15 mm long and 3—10 mm broad; corolla 8—10 mm long, ranging in color from pale yellow to blue and blackish violet; calyx tubular-infundibular, the linear-subulate teeth longer than tube, commonly appressed-hairy; bracteoles linear-subulate, long-acuminate, equaling the pedicel; raceme ovaloid or spherical, 1–2.5 cm long and 1–2 cm broad, 5–30-flowered; peduncle slender, rather firm, usually exceeding the subtending leaf, glabrous or appressed-hairy as are the inflorescence rachis and pedicels; pod curved, coiling through half or two-thirds of a turn, rarely almost straight or coiled through a full turn, prominently reticulate-veined, glabrous or appressed-pubescent, eglandular; seeds irregularly ovaloid. June–August. (Plate X, Figure 5).

Wood margins, glades, meadows, and pastures, at 900–1,500 m. – Caucasus: W. Transc. (rare), E. and S. Transc., Dag. **Gen. distr.**: probably growing in Asia Minor. Described from Borzhomi. Type in Tbilisi.

Note. As a mesophylic as well as a mountain race, growing on such high plateaus as the Akhalkalaki and Leninakan plateaus, M. hemicycla deserves attention on the part of agricultural research workers.

Series 6. **Glutinosae** Grossh. – Pod spiraling through 3–4 turns, medium, to large, glandular-hairy.

14. **M. polychroa** Grossh. Novye dannye k poznaniyu kavkazskikh lyutsern in Zap. Nauchno-Prikl. otd. Tifl. Sada. No. IV (1925) 3; Grossg., Fl. Kavk. II, 261. – M. sativa var. glandulosa Koch, Synops. ed. 1 (1843) 176; Arcangeli Fl. Ital. (1894) 486. – Ic.: Rchb. Ic. Fl. Germ. XXII (1900–1903) 58; Grossg., Obz. Krym.-Kavk. Medicago (1919) 24. – Exs.: Billot, Fl. Gall. et Germ. No. 1158 (sub M. glomerata); Pl. Ital. borealis No. 324 (sub M. glomerata); Pl. or. exs. No. 285.

Perennial; rhizome stout; stems numerous from one rhizome, rigid, erect or rarely ascending, usually branched, 30–60 cm long; stipules united to one-third, triangular-subulate, usually with few teeth at base; leaflets varying in shape and size, appressed-pubescent or on upper surface glabrate, 5–15 (20) mm long, oval to narrowly cuneate, dentate at summit, mucronate from retuse apex; corolla 6–10 mm long, dark violet, blue, green, light yellow, or whitish; standard one and a half times length of keel and wings; calyx tubular-campanulate, appressed-pubescent, mostly glandular, the straight lance-subulate acute teeth longer than tube; pedicels shorter than calyx; bracteoles very small, subulate, as long as or longer than pedicel; inflorescence 10–40-flowered, ovaloid or subcapitate, rather compact; peduncle exceeding the subtending leaf; lower part of inflorescence rachis and pedicels usually glandular; pod spiraling through 2–3 tightly closed coils, 3–5 mm in diameter, not flattened, densely beset with spreading glandular hairs. June–August. (Plate X, Figure 9).

Grassy slopes, wood margins, thickets, gravelly places, taluses, riverine pebbles; as a weed in plowfields, from 500 to 1,500 m. – Caucasus: E. and S. Transc., Dag. Described from central Transcaucasia. Type in Tbilisi.

Var. 1. **glomerata** (Balb.) Arcangeli, Fl. Ital. (1894) 486; Grossg., Novye dannye k poznaniyu kavkazskikh lyutsern (1925) 3; Grossg., Fl. Kavk. II, 261. – M. sativa ssp. macrocarpa Urb b) glandulosa Alef. f. glomerata Urban, Prodr. Monogr. Medicago (1873) 56; Asch. et Gr. Synops. VI (1907) 400. – M. glutinosa var. glomerata Grossh., Obz. Krym.-Kavk. Medicago (1919) 25. – Calyx eglandular; pod glandular. – European part: M. Dnp. (introduced, rare); Caucasus: Cisc. (rare), E. Transc., Tal. (rare). **Gen. distr.**: Med. (W.), Bal.-As. Min., probably Arm.-Kurd.

Var. 2. **denudata** Grossh. Novye dannye k poznaniyu kavkazskikh lyutsern (1925) 3; Grossg., Fl. Kavk. II, 261. — Calyx glandular; pod glabrous. Caucasus: Cisc. (rare).

Note. As far as we know, M. polychroa does not occur in cultivation. Considering, however, its outward characteristics and the nature of its habitat, it certainly represents promising material for introduction work. There is no doubt as to its biological resemblance to M. sativa. The fact that it rises to higher altitudes in mountains than wild M. sativa should certainly be taken into account in cultivation trials, since it may enable exploitation of such regions as would be inaccessible to M. sativa.

156 15. **M. glutinosa** M. B. Fl. taur.-cauc. I (1808) 224; III (1819) 576; Ldb. Fl. Ross. I, 525, p. p.; Boiss. Fl. Or. II, 94, p. p.; Grossg., Obz. Krym.—Kavk. Medicago (1919) 22, p. p. — M. glutinosa var. typica Grossh. Novye dannye k poznaniyu kavkazskikh lyutsern (1925) 2; Grossg., Fl. Kavk. II, 262. — M. sativa ssp. macrocarpa Urb. b) glandulosa Alfl. f. glutinosa (M. B.) Urb. Prodr. Monogr. Medicago (1873) 56. — Ic.: A. Grossg., Obz. Krym.-Kavk. Medicago (1919) 23, 24 (sub M. glutinosa macrocarpa) 30 (sub M. sativa macroc.). — Exs.: Fl. Or. exs. No. 337 (1928).

Perennial; rhizome rather stout, penetrating deep into the soil and capable of spreading sideways; stems 30—60 cm, numerous from one rhizome, branched, erect or ascending, rarely decumbent, angled, more or less appressed-hairy or glabrous; stipules united to one-third or one-half, triangular-subulate, acute, usually toothed at base; leaflets varying in shape and size, appressed-pubescent or on upper surface glabrous, 5—25 mm long, cuneate, rounded-cuneate, oval-cuneate, narrow-cuneate, subrhombic, or linear, dentate in upper part, with a longer tooth from shallow apical notch; corolla 9—12 mm long, sulfureous or whitish yellow, glabrous; standard one to one and a half times length of keel and wings; these equal; calyx tubular-campanulate, glabrous or appressed-pubescent or more or less glandular-pubescent, the straight linear-lanceolate acute teeth longer than tube; pedicels usually shorter than calyx; bracteoles subulate, equaling or exceeding pedicel; inflorescence 7—40-flowered, oblong-ovaloid, ovaloid, or capitate, moderately dense; peduncle 1—4 cm long, exceeding the subtending leaf; peduncle and inflorescence branches glandular-pubescent or subglabrous; pod spiraling through 2—3 tightly closed turns, 6—9 mm in diameter, flattened, densely beset throughout with spreading glandular hairs. June—August. (Plate X, Figure 11).

Subalpine meadows, at (800), 1,200—2,000 m. — Caucasus: Cisc., Dag., E. Transc. Endemic. Described from the Shirvan Mountains (E. part of the Main Caucasus Range). Type in Leningrad.

Var. 1. **glabrata** Grossh., Novye dannye k poznaniyu kavkazskikh lyutsern (1925) 2; Grossg., Fl. Kavk. II, 262. — Pod glabrous; calyx eglandular. — Caucasus: Cisc., E. Transc., Dag.

Var. 2. **denudata** Grossh., Novye dannye k poznaniyu kavkaszkikh lyutsern (1925) 2; Grossg., Fl. Kavk. II, 262. — M. subfalcata Sinskaja in Bot. Zhurn. SSSR XXIII, 4 (1938) 333. — Calyx and pod eglandular, commonly glabrous. — Caucasus: Cisc.

Note. This almost glabrous form of M. glutinosa occurs in the western part of the distribution area, not only in Karachai, as assumed by Sinskaya, but also in Balkariya and the Kazbek area; it has not so far been reported from Dagestan. There is no justification to regard this form as a separate species.

Note. M. glutinosa has outstanding qualities as a forage plant. It has ample foliage and few hairs, and it produces large, profusely branched, bushy plants. It is worth recalling in this connection the view expressed as far back as 1819 by Marshall Bieberstein who, in a note to his diagnosis of this species, states: "deserves attention as forage for cattle and stands up admirably to the climate of the Ukraine." Thus the first suggestion to introduce this species into cultivation on Russian plains was made one hundred and twenty years ago, but no progress has since been made. It should also be noted that M. glutinosa could undoubtedly be pushed much further north than M. sativa or M. falcata and should therefore be seriously taken up by agricultural research.

16. **M. virescens.** Grossh., Obz. Krym.-Kavk. Medicago (1919) 26; Grossg., Fl. Kavk. II, 262. — M. glutinosa f. grandiflora Sinskaja, Bot. Zhurn. SSSR, XXIII, 4 (1938) 323. — Ic.: Grossg., (1919) 27.

Perennial; root not very strong and not deep; stems 20—40 cm long, with sterile branchlets at base, usually ascending, in upper part sparingly branched, angled, pubescent; stipules of basal and cauline leaves united to one-third or one half, broad-ovate at base, narrowly acuminate toward apex, profusely dentate from base, glabrous or pubescent; leaflets 6—12 mm long and 2—6 mm broad, obоval or obovate, rounded or cuneate at base, glabrous or (especially beneath) appressed-pubescent and somewhat glandular, sharp-toothed in upper part, with a longer tooth from apical notch; stipules of uppermost leaves and in inflorescence (the terminal inflorescences are often devoid of subtending leaf, with only stipule remaining) broad-ovate, united to the middle, 3-toothed above, entire at base and at margin, prominently veined, glandular-pubescent; corolla 9—12 (15) mm long, yellowish turning greenish or from outset greenish yellow, narrow, the standard little recurved; calyx tubular-infundibular, ribbed by 10 prominent nerves, densely hispid-glandular, the linear-subulate teeth as long as or longer than tube; pedicels slender, densely glandular, shorter than to as long as calyx; bracteoles linear-subulate, shorter than pedicel; inflorescence a short and rather loose raceme, 2—15- (mostly 4—8)- flowered, sometimes almost corymbose; peduncle firm, glandular-pubescent, 1—2 cm long, exceeding the subtending leaf; inflorescences mostly terminal, axillary ones rare; pod in a spiral of 2—3 turns, flat, 6—9 mm in diameter, prominently reticulate-veined, densely glandular-hirsute. June—July. (Plate X, Figure 10).

Gentle stoneless slopes and dense thickets of subalpine plants, at between 1,200—2,000 m. — Caucasus: Dag. Endemic. Described from Dagestan. Type in Tbilisi.

Note. M. virescens is hardly likely to be of interest for introduction as a forage plant on account of various circumstances mentioned in my earlier publication. However, this medick, like M. glutinosa, is a high-mountain plant and thus belongs to the rare medick type represented in the USSR by only three species (M. glutinosa, M. virescens, and M. dzhavakhetica); this circumstance alone, in pointing toward considerable cold-hardiness, justifies some attention. Trials with this, as well as the two other species, should not be confined to mountains but should also be extended to northern regions of the USSR .

Series 7. **Papillosae** Grossh. — Pod spiraling through 2—4 turns, medium-sized to large, veinless, rather densely covered with long white translucent implexed hairs.

17. **M. papillosa** Boiss. Diagn. sér. 1, 2 (1843) 23; Boiss. Fl. Or. II, 96; Grossg., Obz. Krym.-Kavk. Medicago (1919) 35; Grossg., Fl. Kavk. II, 263. — M. papillosa var. microcarpa Urban, Prodr. Monogr. Medicago (1873) 57. — Ic.: A. Grossg. (1919) 35.

Perennial, with a strong root system penetrating deep into the soil; stems numerous from one rhizome, robust, almost woody at base, sparsely branched 15—40 cm long, densely leafy, 4-angled, appressed-pubescent at the angles; stipules large, united at least to the middle, deeply pinnatifid on the inner side below, in upper part triangular-lanceolate, acute, glabrous, the few very prominent veins almost parallel; leaflets herbaceous to subcoriaceous, 5—8 mm long, obovate-rhombic or cuneate, pubescent on both sides, more densely beneath, the midnerve very prominent, the pinnately arranged lateral veins parallel; corolla 5—7 mm long, golden-yellow to orange-yellow; standard broad, twice as long as wings and keel; wings equaling or scarcely longer than keel; calyx turbinate-campanulate, prominently 5-nerved, appressed-pubescent, the unequal teeth subulate-triangular from a broad base, shorter than tube; pedicels slender, thickened below the flower, appressed-hairy, as long as or slightly longer than calyx; bracteoles one-fourth to half length of pedicel, subulate-acuminate from ovate base; inflorescence densely 8—20-flowered, subcapitate; peduncle slender, exceeding the subtending leaf; pod subglobose in outline, spiraling through 2—4 turns, 5—7 mm in diameter, densely shaggy with simple white translucent implexed hairs which cover the coils and impart to the pod a ball-like
159 appearance, the 6—10 veins arising on the ventral side branching and anastomosing in outer part of the pod, only 5 or 6 radial veins reaching the dorsal margin. June—July. (Plate XI, Figure 1).

Dry, stony or gravelly places in the middle mountain zone, up to 1,200—1,500 m. — Growing in Turkey (former Olty, Kagyzman, and Surmali districts). Possibly occurring in S. Transc. **Gen. distr.**: Bal.-As. Min. (Asia Minor). Described from Turkish Armenia. Type in Geneva.

Note. M. papillosa displays no morphological characters that might be considered valuable for forage use, but the plant deserves attention on account of its drought resistance and should be considered for trials, if not for its own sake then with a view to hybridization.

18. **M. dzawakhetica** Bordz. in Protok. zased. Kïevsk. Obshch. Estestv. (1907) 24; Grossg., Obz. Krym.-Kavk. Medicago (1919) 36. — Ic.: Grossg. l. c., 37. — Exs.: Fl. Or. exs. No. 187.

Perennial; rhizome woody, stout, penetrating deep into the soil; stems numerous from one rhizome, 10—25 mm long, rather slender, 4-angled, often trailing and ascending, appressed-hairy; stipules united to one-quarter or one-third, triangular-lanceolate in free portion, appressed-pubescent, the outer margin pectinate-toothed, especially at base; leaflets quite glabrous or with few appressed hairs above, appressed-hairy beneath, obovate or oboval, 6–9 mm long, pinnately veined, smooth-margined, retuse and mucronate; corolla 5–8 mm long, lemon-yellow or golden-yellow; standard rather broad, one and a half times to twice as long as keel and wings; these about equal; calyx appressed-hairy, turbinate-campanulate, the unequal triangular-lanceolate teeth shorter to longer than tube; pedicels slender, as long as or longer than calyx; bracteoles triangular-subulate, whitish, one-fifth to one-third length of pedicel; racemes 5–12-flowered, rather dense, almost capitate; peduncle slender, equaling or exceeding the subtending leaf; pod spiraling through 2–4 turns, 3.5–6 mm in diameter, reticulate-veined, subglabrous or sparsely (rarely densely) covered with short simple hairs. June–August. (Plate XI, Figure 2).

Dry gravelly slopes, taluses, stones, rocks, rarely grassy places, in the alpine zone at 1,800–2,400 m.—Caucasus: E. and S. Transc. **Gen. distr.:** Bal.-As. Min. (Asia Minor). Described from the Akhalkalaki District. Type in Kiev.

Var. 1. **timofeevi** N. Troitzky ex Grossg., Fl. Kavk. II (1930) 263.— Taller plants, with erect stems, reminiscent of M. falcata; leaflets narrower.

Caucasus: E. Transc., in subalpine zone, rare.

Note. The forage properties of M. dzhawakhetica, as indicated by its appearance, are satisfactory, especially in the case of var. timofeevi, associated with lower altitudes and, apparently with more mesophilic habitats. Trials with cultivation of this species are urgently needed. There is good reason to assume that M. dzhawakhetica will play an important part in the building up of cultivated pastures and hayfields of these regions. Chemical analysis of M. dzhawakhetica samples from the Kirovabad area, carried out at our initiative by P. Kh. Popaidopulo and E. A. Petrosyan at Tbilisi, gave the following percent composition for 100 g oven-dry weight: ash 9.22, crude protein 22.03, crude fat 2.57, crude cellulose 22.70, nitrogen-free extract 43.49, nitrogen 3.524. It is evident that the amount of protein is very considerable and M. dzhawakhetica may be regarded as being of high feed value.

Series 8. **Marinae** Grossh.— Pod spiraling through 2–4 turns, densely white-tomentose, the margins of coils with rather prominent spines or tubercles.

19. **M. marina** L. Sp. pl. ed. I (1753) 779; Boiss. Fl. Or. II, 96; Urban, Prodr. Monogr. Medicago (1873) 59, Grossg., Obz. Krym.-Kavk. Medicago (1919) 38.— M. marina f. inermis Rouy et Fouc., F. tuberculata Rouy et Fouc., f. genuina Grossh., Fl. Kavk. II (1930) 264.— Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 62; Grossg. (1919) 38.— Exs.: Fl. Palaest. ex. No. 63.

Perennial; rhizome stout, penetrating deep into the soil; stems numerous from one rhizome, 10–30 cm long, mostly decumbent or ascending, often branched especially at base, the underground stem parts long and slender; stipules rather large, ovate-lanceolate, acute, entire or minutely 1- or 2-toothed at base, with several prominent longitudinal veins, pubescent;

leaflets 5–8 mm long, obovate-cuneate, rather broad in upper half, canescent above by a dense cover of soft white hairs, whitish beneath, the upper margin dentate throughout; corolla 6–8 mm long, bright yellow or lemon-yellow; standard broad, much longer than the equal keel and wings; calyx campanulate, densely covered throughout (including pedicel) with appressed white pubescence, the triangular-lanceolate acute teeth as long as tube; pedicels stoutish, shorter than calyx-tube; bracteoles subulate, acute, shorter than pedicel; inflorescence capitate, densely 5–16-flowered, flowering peduncle shorter than the subtending leaf, usually longer in fruit; pod 5–6 mm in
161 diameter, in a spiral of 2–4 turns, with rather loosely incumbent coils, densely white-tomentose, unarmed (f. inermis) or tuberculate (f. tuberculata) or with few short spines (f. genuina); veins from ventral suture 5–8, anastomosing on outer part of the coil and then parallel to dorsal suture. June–July. (Plate XI, Figure 4).

Seaside sands. – European part: Crim.; Caucasus: W. Transc. **Gen. distr.**: Med. (W. and E.), Bal.-As. Min. Described from the Mediterranean region. Type in London.

Note. The morphological properties of M. marina are very undesirable and the species can hardly be considered as a potential subject for cultivation.

Subgenus 3. **ORBICULARIA** Grossh. – Pod many-seeded, with several coils, flat, orbicular, always unarmed.

Section 1. SCUTELLATA Urb. Prodr. Monogr. Medicago (1873) 63. – Each coil of the pod containing 2 seeds; radicle less than half length of cotyledons.

20. **M. scutellata** All. Fl. Pedem. I (1785) 315; Ldb. Fl. Ross. I. 528; Boiss. Fl. Or. II, 96; Urban, Prodr. Monogr. Medicago (1873) 63, Shmal'g., Fl. I, 226. – Ic.: Sibth. Fl. Graec. 769; Rchb. Ic. Fl. Germ., XXII, tab. 63; Hegi, Ill. Fl. IV, 3 Teil, 1267, f. 1377.

Perennial, glandular-pubescent; stems 15–40 cm long, slender, weak; stipules ovate-lanceolate, dentate; leaflets obovate to oblong, dentate; corolla 5–6 mm long, yellow or mostly orange-yellow; standard about twice the length of both wings and keel; pedicels shorter than calyx-tube and the lanceolate bracteoles; raceme 1–3-flowered, much shorter than the subtending leaf; pod to 15 mm in diameter, flat on one side, convex on the other, unarmed, glabrous, with 5 or 6 coils; veins from ventral suture 10–14, oblique, very prominent, on the outer half of the pod surface mostly reticulately anastomosing and finally confluent with dorsal suture. May–June. (Plate X, Figure 8).

Meadows and wood margins. – European part: M. Dnp., Bl., Crim. **Gen. distr.**: Med. (W. and E.), Bal.-As. Min. (Balkans). Described from Italy. Type in London.

Section 2. ORBICULARES Urb. Prodr. Monogr. Medicago (1873) 60. – Each coil of the pod containing (3) 4 or 5 seeds; radicle about as long as the cotyledons.

21. **M. orbicularis** All. Fl. Pedem. I (1785) 314; Ldb. Fl. Ross., I, 528; Boiss. Fl. Or. II, 97; Urban, Prodr. Monogr. Medicago (1873) 60; Shmal'g., Fl. I, 226; Grossg., Obz. Krym.-Kavk. Medicago (1919) 40; Grossg., Fl. Kavk. II, 261. — Ic.: Rchb., Ic. Fl. Germ. XXII, tab. 63; Fl. Tadzhik. V, tab. 13, p. 8.

Annual; roots short, slender; stems slender, decumbent or ascending, usually glabrous, branched from base, 10—40 cm long; stipules to 5—6 mm long, deeply pectinate-incised nearly to base, with slender subulate-linear segments; leaflets glabrous or rarely glandular-hairy, 5—13 mm long, obovate-cuneate to almost obtriangular, denticulate especially at summit, often slightly notched at apex with a tooth in the notch; corolla 4—5 mm long, orange-yellow; standard large, about twice as long as the equal keel and wings; calyx broadly turbinate-campanulate, obscurely nerved, glabrous or sparingly appressed-pubescent; teeth subulate-triangular, acute, prominently 1-nerved on the back, usually as long as tube; pedicels capillary, nodding, as long as or longer than calyx, elongating and becoming stouter in fruit; bracteoles obsolescent; inflorescence 1—3—5-flowered; peduncle shorter than the subtending leaf; usually but a single pod developing from each inflorescence; pod lenticular, slightly convex on both sides, 3—17 (mostly 12—14) mm in diameter, of 3—4 loosely incumbent coils, unarmed, glabrous (f. typica Rouy et Fouc.) or glandular-hairy (f. pilosa Benth.), stramineous when mature, later blackening; transverse veins several from ventral suture, crossing the entire surface of the coil, prominent, terminating in dorsal suture; seeds brown, ovate-triangular, convex, finely tuberculate-punctate. May—June. (Plate X, Figure 7).

Grassy slopes, open scrub, steppe sites, sands, and pebbles, in the lower mountain zone, up to 500—800 m). — European part: Crim.; Caucasus: Cisc., W., E., and S. Transc., Dag., Tal.; Centr. Asia (rare): Syr D., Pam.-Al., Mtn. Turkm. **Gen. distr.**: Med. (W. and E.), Bal.-As. Min., Arm.-Kurd., Abyssinia. Introduced in Centr. Eur. Described from S. Europe. Type in London.

Note. The growth habit of M. orbicularis changes in relation to the degree of dryness of the habitat; in grass stands it becomes almost erect. This suggests that, as a component of forage plant mixtures, M. orbicularis could play a significant role, even though its forage quality is on the whole rather low.

Subgenus 4. **SPIROCARPOS** Grossh. — Section Spirocarpos Ser. in DC. Prodr. I (1825) 188. — Pod many-seeded, of several closely appressed coils, commonly spiny or, as a result of reduction of spines, unarmed, doliform or globose, rarely flat.

Section 1. **PACHYSPIRAE** Urban, Prodr. Monogr. Medicago (1873) 65. — Coils of pod very closely appressed to each other, almost united; spines, when present, not sulcate; in a right- or left-handed spiral while still within the calyx; radicle shorter than cotyledons.

22. **M. soleirolii** Duby Bot. Gall. (1828), 124; Urban, Prodr. Monogr. Medicago (1873) 65; Grossg., Obz. Krym.-Kavk. Medicago (1873) 65;

Grossg., Obz. Krym.-Kavk. Medicago (1919) 41. — M. plagiospira Dur. ex Shmal'g., Fl. I (1895) 228.

Annual; stems slender, decumbent or ascending, rarely erect, branched, 20—50 cm long; stipules ovate-lanceolate, deeply toothed, incised or parted nearly to base; leaflets obovate or sometimes subrhombic from cuneate base; corolla yellow, 8—9 mm long; standard and keel longer than wings; calyx glandular-pubescent, the subulate-linear teeth twice as long as tube; pedicels slender, about the length of calyx-tube; inflorescence 3—7-flowered; peduncle mostly exceeding the subtending leaf, the rachis prolonged into awn above inflorescence; pod unarmed, usually in a left-handed spiral of 3—8 turns, 5—7 mm in diameter; transverse veins 6—8 from ventral suture, arching, gradually becoming thicker and in outer half of the coil surface reticulately anastomosing; seeds subreniform. May—June.

Grassy slopes and weed-infested places. — European part: Crim. (Sevastopol', adventive, not recently found). **Gen. distr.:** Med. (W.). Described from France. Type in Paris.

23. **M. tribuloides** Desr. in Lam. Encycl. Meth. III (1789) 635; Ldb. Fl. Ross. I, 528; Boiss. Fl. Or. II, 99; Grossg., Obz. Krym.-Kavk. Medicago (1919) 41 p.p.; Grossg., Fl. Kavk. II, 265, p.p. — M. truncatula Gaertn. b) longeaculeata Urban, Prodr. Monogr. Medicago (1873) 67. — Ic.: Grossg. (1919) 42.

Annual; taproot slender; stems rather slender, to 40 cm long, branched from base, weak and decumbent, pubescent; stipules ovate-lanceolate, connate at base, deeply pinnatifid with narrow segments; leaflets obovate-cuneate, more or less pubescent, 3—7 mm long, dentate in upper part, truncate or broadly emarginate at apex; corolla orange-yellow, 4—5 mm long; standard broad, one and a half times as long as both keel and wings; calyx turbinate-campanulate, appressed-pubescent throughout, the triangular-lanceolate acute teeth about as long as or longer than tube; pedicels hairy, shorter than calyx-tube; bracteoles broadly triangular, white-membranous, much shorter than pedicel; racemes 2—4-flowered; peduncle slender, equaling or exceeding the subtending leaf; pod in a spiral of 4—6 turns, glabrous or sparingly hairy, 6—10 mm in diameter, cylindric, flat at both ends; margin of coils with 2 tubercles distinct at first, later suppressed, and 2 rows of prickles, these straight, strong, sometimes slightly uncinate, longer than half width of coil and often more than half pod diameter; transverse veins 6—10, almost straigh 164
or slightly curved, inconspicuous at maturity, in upper part sometimes anastomosing; seeds few, brown, reniform. May—June. (Plate XI, Figure 9).

Dry barren, mostly stony slopes, and riverine pebbles. — Caucasus: Cisc. (rare), E. Transc., Tal. **Gen. distr.:** Med. (W. and E.), Bal.-As. Min., Arabia. Described from France. Type in Paris.

Note. The properties of M. tribuloides render it definitely unsuitable for forage use; on the contrary, this plant often occurs in pastures as an undesirable weed.

24. **M. rigidula** Desr. in Lam. Encycl. Meth. III (1789) 634; Urban, Prodr. Monogr. Medicago (1873) 58; Shmal'g., Fl. I, 227; Grossg., Obz. Krym.-Kavk. Medicago (1919) 42; Grossg., Fl. Kavk. II, 266. — M. gerardi W. K. ex Ldb. Fl. Ross. I, 529; Boiss. Fl. Or. II, 100. — Ic.: Grossg. (1919) 42; Fl. Tadzhik. V (1937). tab. 13, p. 5.

Annual; stems numerous from one rhizome, slender, pubescent, 10–30 cm long, mostly decumbent, rarely erect, branched; stipules rather large, ovate, united in lower part, deeply pinnatifid with acute segments; leaflets more or less pubescent, obovate or obcordate, cuneate at base, 5–8 mm long, dentate in upper part, often notched at summit, with a tooth in the notch; corolla 4–6 mm long, orange-yellow; standard very broad, as long as both keel and wings; calyx turbinate-campanulate, appressed-woolly throughout, the triangular-lanceolate acute teeth longer than tube; pedicels hairy, shorter than calyx-tube; bracteoles white-membranous, ovate, as long as or shorter than pedicel; racemes 1–3-flowered; peduncle slender, hairy, equaling or shorter than the subtending leaf; pod in a spiral of 6–7 turns, cylindric-ovoid, convex at both ends, appressed-puberulent, sometimes glandular, the margin of coils with 2 grooves, these distinct at first, later obsolescent, and a double row of triangular-subulate spines, these mostly shorter than half diameter of the pod; veins 8–14, reticulately anastomosing in upper third of the coil; seeds few, reniform-navicular, castaneous-brown. March–May. (Plate XI, Figure 12).

Pastures, dry hill slopes, stony places, rocks, heavily grazed pastures, from sea level to 1,500 m. — European part: L. V. (rare), Bes. (rare); Caucasus: W. (rare), E. and S. Transc., Dag., Tal.: Centr. Asia: Syr D., Pam.-Al., Kara K., Mtn. Turkm. **Gen. distr.**: Med. (W. and E.), Bal.-As. Min., Arm.-Kurd., Iran., Mesopotamia. Described from the Mediterranean region. Type in London.

Note. From the point of view of pasturage, M. rigidula is undesirable and may be considered a weed of pastures.

25. **M. agrestis** Tenore ex DC. Prodr. II (1825) 179. — M. rigidula β agrestis Shmal'g., Fl. I (1895) 227; Grossg., Obz. Krym.-Kavk. Medicago (1919) 43; Grossg., Fl. Kavk. II, 266. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 69 (sub M. gerardi).

Annual; stems weak, often decumbent, branched, 10–40 cm long; stipules small, triangular-lanceolate, pectinate-toothed; leaflets obovate-cuneate, in upper part denticulate, glabrous or sparingly hairy; corolla 4–5 mm long, yellow; calyx campanulate-oblong, with slender subulate teeth; inflorescence 2–5-flowered; peduncle slender, usually exceeding the subtending leaf; bracteoles very small; pod with 4–5 coils, flat at both ends, 6–9 mm in diameter, densely puberulous; spines equaling or less than half pod diameter, rather thick, uncinate. May–June. (Plate XI, Figure 10).

Dry gravelly and stony slopes, up to 1,000 m. — European part: Bes., Bl., Crim. (rare); Caucasus: Cisc., W. (rare) and E. Transc., Dag. (rare), Tal.; Centr. Asia: Kara K. (Krasnovodsk). **Gen. distr.**: Med. (W. and E.), Bal.-As. Min. Described from Italy. Type in Palermo (?).

Note. Not eaten by livestock and constituting a weed in pasture.

26. **M. litoralis** Rohde in Lois. Not. (1810) 118; Boiss. Fl. Or. II, 98; Urban, Prodr. Monogr. Medicago (1873) 69; Grossg., Obz. Krym.-Kavk. Medicago (1919) 54; Grossg., Fl. Kavk. II, 265. — Ic.: A. Grossg. (1919) 44; Rchb. Ic. Fl. Germ. XXII, tab. 71. — Exs.: Fl. Palaest. exs. No. 64.

Annual; roots short, slender; stems slender, mostly decumbent or prostrate, 20–40 cm long, much branched, angled, in lower part glabrate, in upper part appressed-pubescent; stipules small, green, lance-triangular, with 2 or 3 deep sharp teeth; leaflets obcuneate, to 10 mm long, toothed in upper part, light green, appressed-pubescent beneath, glabrous or sparingly hairy above; corolla 5–6 mm long, sulfureous or orange-yellow; standard not very broad, about twice as long as keel and wings, these of equal length; calyx turbinate-campanulate, appressed-hairy, eglandular, the equal subulate-lanceolate teeth usually slightly longer than tube; pedicels short, slender, shorter than calyx-tube; bracteoles subulate, usually shorter than pedicel; inflorescence often 1-flowered, commonly 2- or 3-flowered; peduncle slender, shorter than the subtending leaf; pod cylindric, of 3–5 turns, 166 4–6 mm in diameter, flat at both ends, quite glabrous; surface of coil with a network of slender veins confluent with the seed-bearing suture; dorsal suture thick, flanked by 2 later sometimes disappearing grooves; spines rather numerous, relatively long (f. longiseta DC.) or short (f. breviseta DC.); seeds reniform, ferruginous. May–June. (Plate XI, Figure 8).

Seaside sands, sandy and sandy-clay hills, rarely dry melkozem slopes. — Caucasus: W. (rare) and E. Transc. (mainly Apsheron); Centr. Asia: Kara K. (extreme W.). **Gen. distr.**: Med. (E. and W.), Bal.-As. Min. Described from southern France (?).

Note. Of no value for forage use, both on account of its morphological features and the profusion of prickly pods.

27. **M. globosa** Presl. Del. Prag. (1822) 45; V. Lipskii in A.H.P. XIV, 2, 256; Grossg., Obz. Krym.-Kavk. Medicago (1919) 44; Grossg., Fl. Kavk. II, 265. — Exs.: Heldreich, Herb. Graec. norm. No. 835.

Annual; stems weak, commonly trailing, branched, more or less pubescent, 10–30 cm long; stipules very small, triangular-lanceolate, dentate; leaflets obcuneate, emarginate and denticulate at apex, glabrous or sparingly hairy, usually small; corolla 4–5 mm long, light yellow; calyx tubular-campanulate, with subulate teeth; inflorescence 1–3-flowered; peduncle slender, equaling or slightly exceeding the subtending leaf; bracteoles very small; pod of 7–8 turns, doliform, ovate-oval in outline, glabrous, 7–8 mm in diameter, 10–12 mm high, the margin of coils with a double row of spines, these numerous, rather strong, slightly uncinate, mostly about half as long as pod diameter, April–May. (Plate 11, Figure 11).

Grassy slopes. — Caucasus: W. Transc. (Sukhumi). **Gen. distr.**: Med. (W. and E.). Described from E. part of Mediterranean region.

Note. It is very likely that this plant was adventive in Sukhumi and that it later disappeared, since, to judge by Lipsky's collections from the year 1895, it was not found there by anybody.

Section 2. **EUSPIROCARPAE** Urban, Prodr. Monogr. Medicago (1873) 73. — Pod laxly coiled; prickles, when present, sulcate; pod acquiring a right-hand turn when out of the calyx; radicel roughly half as long as cotyledons.

28. **M. arabica** All. Fl. Pedem. 1 (1785) 315; Urban, Prodr. Monogr. Medicago (1873) 73; Shmal'g., Fl. I, 227; Grossg., Obz. Krym. — Kavk. 167 Medicago (1919) 45; Grossg., Fl. Kavk. II, 216. — M. maculata Sib. ex Ldb. F. Ross. I (1842) 529; Boiss. Fl. Or. II, 103. — Ic.: Grossg. (1919) 45; Rchb. Ic. Fl. Germ. t. XXII, tab. 67.

Annual; taproot slender; stems rather slender, often decumbent, 4-angled, to 50–60 cm long, branched from base and in upper part, covered, as are more profusely stipules and calyces, with soft articulate hairs; stipules rather large, green, broadly ovate-lanceolate, deeply pectinate-toothed or incised; leaflets commonly glabrous, to 2.5 cm long and to 2 cm broad, broadly triangular-obcuneate, emarginate and obtusely toothed at apex, often with a broad dark spot at base; petiole slender, weak, to 10 cm long or longer; corolla 4.5 mm long, yellow or orange-yellow, twice as long as calyx; standard rather broad, about twice as long as keel and wings, these equal in length; calyx broadly campanulate, glabrous or nearly so, the triangular-lanceolate teeth as long as or longer than tube; pedicel slender, usually shorter than calyx; bracteoles triangular-subulate, membranous, as long as or shorter than pedicel; inflorescence loosely 1–5-flowered; peduncle slender, often pendent, shorter than the subtending leaf; pod globular-cylindric, glabrous, 5–8 mm in diameter, with 3–7 turns; veins 4–6 from ventral suture, reticulately confluent with concentric loops, the outer margin of coils somewhat thickened, with 4 ridges separated by 3 grooves, and a double row of spines, these long, deeply sulcate, usually arched-recurved; seeds cinnamon-brown, reniform. April–June. (Plate XI, Figure 15).

Close meadow thickets, glades, wood margins, and thickets of small shrubs, mainly on sandy soils. – European part: Crim.; Caucasus: W. and E. Transc., Tal. **Gen. distr,**: Med. (W. and E.), Bal.-As. Min. Described from Italy.

Var. 1. **longispina** Rouy et Fouc. Fl. France V, 34. – Spiral turns 3–5; spines subulate, curved, about equaling pod diameter. – European part: Crim.; Caucasus: W. and E. Transc., Dag., Tal.

Var. 2. **heptacycla** Urban, l. c. – Spiral turns 7; spines short. Caucasus: Tal. (rare).

Note. The morphological features of M. arabica justify serious attention with a view to introduction of this plant into cultivation as a forage plant.

The characteristics indicated, such as smoothness of foliage, the vigorous and profuse growth, etc., are very favorable. It must be admitted that the pods are heavily armed, but few of them are produced and the spines are very soft; thus the pods are not as spiny as in some other Medicago species and their consumption does not constitute a danger to livestock. In designing introduction trials, it should be taken into consideration that, being distributed in the Caucasus, the plant is certainly partial to humid climate and that a certain amount of sand in the soil is necessary.

M. arabica has been observed as a forage plant in meadows of the lowland zone of the Lenkoran District; it is certainly not sown in the hayfields of this region but is self-seeded from the wild. It grows nevertheless in close stands and in great abundance; in such thickets its growth is upright and very luxuriant and it does not suffer from trampling under these conditions; it does represent an important component in such hayfields and greatly improves the quality of hay obtained from them. Such meadows are mown in the Lenkoran District toward the end of May and at the beginning of May.

(169)

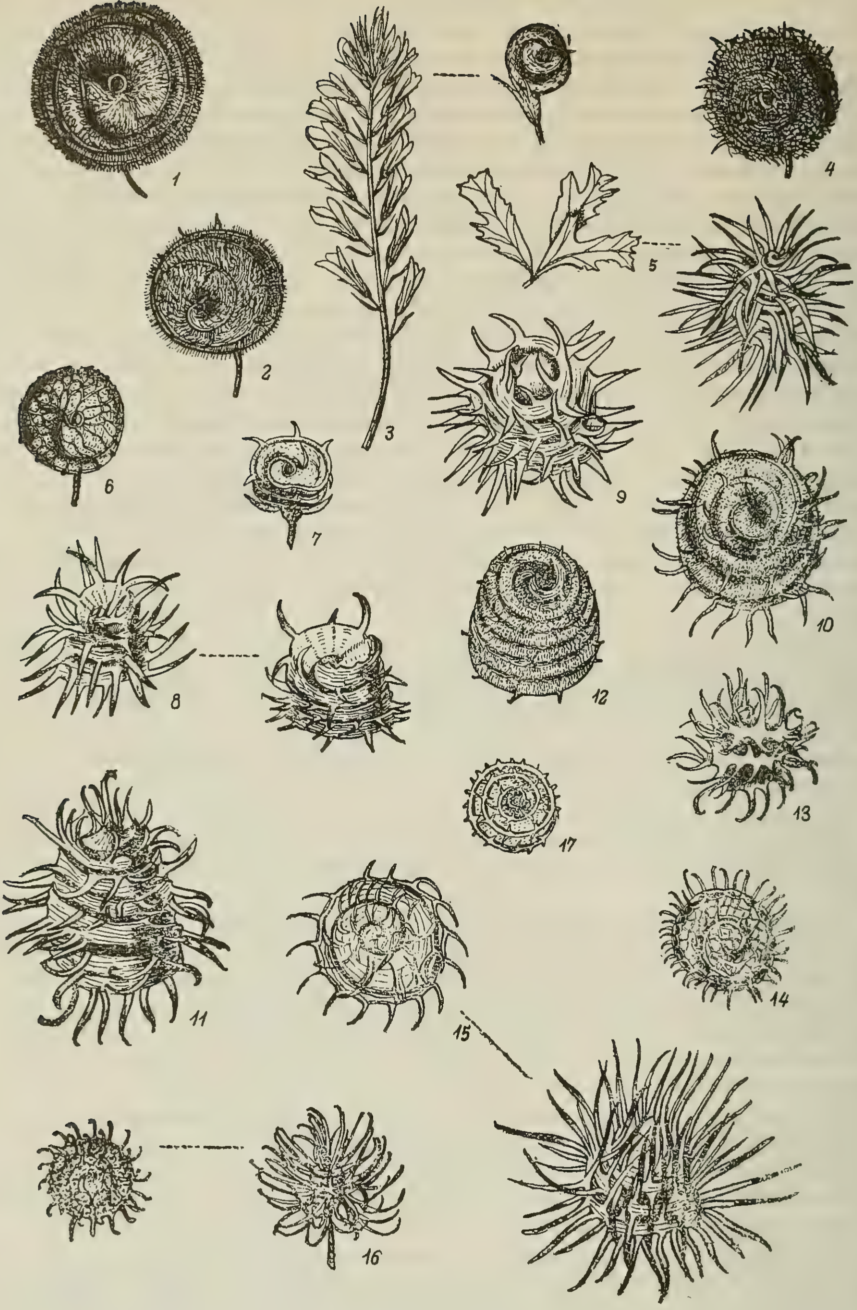

PLATE XI. 1 — Medicago papillosa Boiss.; 2 — M.dzhawakhetica Bordz.; 3 — M.coerulea Less.; 4 — M.marina L.; 5 — M.laciniata L.; 6 — M.saxatilis M.B.; 7 — M.daghestanica Rupr.; 8 — M.littoralis Rhode.; 9 — M.tribuloides Desr.; 10 — M.agrestis Ten.; 11 — M.globosa Presl.; 12 — M.rigidula (L.) Desr.; 13 — M.praecox DC.; 14 — M.denticulata Willd.; 15 — M.arabica All.; 16 — M.minima Grufb.; 17 — M.minima var.brachyodon Grossh.

29. **M. denticulata** Willd. Sp. pl. III (1800) 1414; Ldb. Fl. Ross. I, 530; Boiss. Fl. or. II, 102; Shmal'g., Fl. I, 227; Grossg., Obz. Krym.-Kavk. Medicago (1919) 46; Grossg., Fl. Kavk. II, 266. — M. hispida Gaertn. macrocarpa a) oligopyra γ denticulata Urban, Prodr. Monogr. Medicago (1873) 74. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 70; Grossg. (1919) 47; Fl. Tadzhik. V (1937), Plate 12 and Plate 13, Fig. 3.

Annual; stems angled, glabrous, usually prostrate or decumbent, rarely erect, branched from base, 20—60 cm long; stipules rather large, united at base, deeply pectinate-incised into narrow capillary-awned segments; leaflets glabrous or with few simple hairs, emaculate, 7—25 mm long and 3—20 mm broad, obovate, dentate and sometimes emarginate at apex; corolla 3—4 mm long, yellow or orange-yellow; standard moderately broad, one and a half times as long as keel and wing; calyx broadly campanulate, at first rather profusely covered with simple hairs, later glabrescent; teeth broad-triangular, ensiformly recurved, acute, as long as or slightly longer than tube; pedicels slender, as long as or shorter than calyx-tube; bracteoles minute, linear-subulate; raceme loosely 1—8- (mostly 2- or 3)- flowered; pedicel slender, often nodding, commonly shorter than the subtending leaf, much less frequently as long or somewhat longer; pod discoid, mostly with $1\frac{1}{2} - 2\frac{1}{2}$, rarely 3—4 coils, flat at both ends, glabrous, 4—6 mm in diameter; nerves on coil surface numerous, prominent, arching, in outer half looped-anastomosing; outer margin thickened, with a ridge flanked by 2 grooves on the distal side of the spines; spines in a double row, subulate, uncinate, deeply sulcate, mostly about half the pod diameter, horizontally spreading, rarely arched-recurved; seeds elongate-reniform, ferruginous. April—June. (Plate XI, Figure 14).

Clayey soils and waste places. — European part: Crim.; Caucasus: Cisc., W. and E. Transc.; Centr. Asia: Syr D., Mtn. Turkm. **Gen. distr.**: Med. (W. and E.), Bal.-As. Min. Described from the Mediterranean region. Type in Berlin.

Var. 1. **apiculata** (Willd.) Fl. Alp. marit. II, 106. — M. apiculata Willd. sp. pl. III (1800) 1414. — Ic. Rchb. Ic. Fl. Germ. XXII, tab. 67. — Pod 4 mm in diameter; spines shorter than half pod diameter, equaling thickness of coil. — European part: Crimea (rare).

Var. 2. **caspica** (Jacq.) Grossh. — M. caspica Jacq. ex Spring. Nov. prov. (1819) 27. — Pod 6 mm in diameter; spines longer than half pod diameter, often arching; inflorescence many-flowered; pods up to 10 on peduncle; plant vigorous, with relatively large leaflets. — Caucasus: E. Transc. (part of Azerbaijan bordering the Caspian).

Note. M. denticulata displays relatively feeble xeromorphic characteristics, but its foliage is less developed than that of M. arabica. Moreover, it habitually has a prostrate growth habit and never produces upright plants. This condition, combined with profusion of prickly fruit, offers no prospects of utilization and the plant must be considered as a pasture weed, rather like species of the preceding section.

30. **M. nigra** Willd. Sp. pl. III (1800) 1418; Grossg., Obz. Krym.-Kavk. Medicago (1919) 47. — M. hystrix Ten. ex Shmal'g., Fl. I, 228. — M. hispida bb. macrocarpa Urb. b) pentacycla Urban, Prodr. Monogr. Medicago (1873) 75.

Annual; stem rather slender, angled, often branched from base, to 60 cm long; stipules fairly large, united at base, deeply pectinate, with narrow linear segments; leaflets obovate or cuneate, often emarginate at apex, dentate in upper part, glabrous or with scattered nonarticulate hairs; corolla 4–5 mm long, yellow or orange-yellow; standard longer than keel and wings; calyx campanulate, the acute teeth as long as or longer than tube; pedicel slender; bracteoles very small; racemes 1- or more often 2-flowered, rarely more-flowered; peduncle slender, shorter than the subtending leaf; pod glabrous, cylindric, flat at both ends, 7–10 mm in diameter, spiraling through 4–6 turns; nerves radially looped-reticulate, rather thick and prominent; spines on outer margin of coils sulcate, usually straight, 172 uncinate, as long as or rarely somewhat shorter than pod diameter. April–May.

Dry grassy slopes and waste places.— European part: Crim. (Sevastopol'). **Gen. distr.**: Med. (W. and E.), Bal.-As. Min. Described from the Mediterranean region. Type in Berlin.

Note. Found only once; probably introduced and then disappeared.

31. **M. praecox** DC. Cat. Monsp. (1813) 123; Boiss. Fl. Or. II, 102; Urban, Prodr. Monogr. Medicago (1873) 75; Shmal'g., Fl. I, 227; Grossg., Obz. Krym.-Kavk. Medicago (1919) 48.— Ic.: Grossg. (1919) 49; Rchb. Ic. Fl. Germ. XXII, tab. 68.

Annual; taproot slender, branched from base; stems prostrate and trailing, slender, 4-angled and sulcate, 5–10 (20) cm long; stipules semioval, deeply pectinate, with filiform segments; leaflets glabrous or appressed-pubescent, obcordate or obovate-cuneate, to 5 mm long and broad, dentate at summit; corolla 1–3 mm long, yellow or orange-yellow; standard very broad, slightly longer than keel; calyx covered with appressed white hairs, campanulate, dark, prominently 5-nerved, the nerves terminating in the teeth; teeth lance-subulate, acute, as long as tube; pedicels appressed-hairy, shorter than calyx; racemes 1- or 2-flowered; with only a single pod developing; peduncle appressed-pubescent, much shorter than the subtending, leaf; pod 3–4 mm in diameter, discoid, flat at both ends, glabrous or more or less appressed-hairy, with 2–3 very loose coils; veins arching, looped-anastomosing; spines on the margin of coils in a double row, subulate, uncinate, straight to arching, longer than half pod diameter; surface of pod between spines smooth, not grooved; a groove on inner side of each spine descending onto the flat surface of the coil; seeds ovaloid-reniform, castaneous. May–May [sic]. (Plate XI, Figure 13).

Thickets of small xerophytic shrubs on dry gravelly slopes.— European part: Crim. **Gen. distr.**: Med. (W.), Bal.-As. Min (Greece). Described from southern France. Type in Paris.

Note. Of no interest for forage use.

32. **M. daghestanica** Rupr. in Boiss. Fl. Or. II (1872) 95; Urban Prodr. 173 Monogr. Medicago (1873) 76; Grossg., Obz. Krym.-Kavk. Medicago (1919) 10; Grossg., Fl. Kavk. II, 265.— Ic.: Grossg. (1919) 49.

Perennial, with a strong and penetrating root system; stems numerous from one rhizome, appressed-pubescent, slender, 4-angled, decumbent or ascending, 20–40 cm long, strongly lignified at base; stipules of lower leaves semisagittate, acute, very prominently veined, several-toothed in lower part, those of upper leaves narrower and often entire; leaflets 5–8 mm long, triangular-obcordate or obcuneate, dentate and slightly emarginate at summit, somewhat stiffish, prominently veined, glabrous or often appressed-pubescent on the midrib beneath; corolla 6–8 mm long, white or light blue or light violet, usually expanded; standard broad, twice length of calyx, slightly longer than keel and wings; calyx broadly campanulate, rather densely appressed-pubescent, the slender subulate teeth slightly longer than tube; pedicels slender, appressed-pubescent, as long as or shorter than calyx; pod 3–5 mm in diameter, cylindric, flat at both ends, spiraling through 3–5 turns, usually glandular-pubescent or subglabrous; veins slender, inconspicuous, anastomosing, the margin with 2 deep grooves and few spines, these rather short, slender, often slightly curved; seeds small, dark brown. June–July. (Plate XI, Figure 7).

Calcareous taluses and rocks in the middle mountain zone. – Caucasus: Dag. Endemic. Described from Dagestan. Type in Leningrad.

Note. Of no interest for forage use.

Section 3. **LEPTOSPIRAE** Urban, Prodr. Monogr. Medicago (1873) 76. – Pod lax, with remote turns; spines, if present, long-sulcate; radicle always more than half length of cotyledon; young pod in a right-handed spiral above the calyx.

33. **M. coronata** (L.) Desr. in Lam. Encycl. Meth. III (1785) 634. – M. polymorpha η coronata L. Sp. pl. (1753) 780. – Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 64. – Exs.: Heldreich, Herb. Graec. Norm. No. 838.

Annual; stems slender, weak, branched, 10–20 cm long; stipules ovate to lanceolate, more or less crenate, especially at base; leaflets rather small, obcordate-orbicular; flowers 4–5 mm long; corolla yellow; keel longer than wings; calyx-teeth subulate-lanceolate; racemes 5–12-flowered, overtopping the subtending leaf; pod with several turns, 2–3 mm in diameter, the short straight spines fused at margin into a crown surrounding the pod. April–May.

Dry slopes. – Caucasus: E. Transc. (Baku). **Gen. distr.**: Med. (W. and E.) Described from southern France. Type in London.

Note. The record on the label referring to M. coronata in C. A. Meyer's herbarium reads: Baku. The plant has not been collected in the USSR by anyone since, and it is possible that labels were mixed up.

34. **M. laciniata** L. Sp. pl. (1753) 781 – Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 64.

Annual; stems weak, ascending, branched, 20–50 cm long; stipules lanceolate, acuminate, dentate; leaflets obcordate-obovate, coarsely toothed or mostly pinnately cristate-incised; flowers rather small; corolla yellow; keel as long as or slightly shorter than wings; calyx-teeth half to two-thirds as long as tube; pod in a spiral of 5–7 turns, 4–5 mm in diameter, densely beset with spines, these straight, usually longer than half pod diameter; racemes 1- or 2-flowered, barely equaling the subtending leaf. May. (Plate XI, Figure 5).

Waste places. – European part: M. Dnp. (Akhtyrka District). **Gen. distr.**: Med. (W. and E.), Bal.-As. Min., Iran. Described from the Mediterranean region. Type in London.

Note. Obviously introduced; collected only once in a vegetable garden (specimens in Kharkov).

35. **M. minima** Grufberg in Linné, Amoen. IV (1759) 105.— M. polymorpha var. minima L. Sp. pl. (1753) 780; Grossg., Obz. Krym.-Kavk. Medicago (1919) 50; Grossg., Fl. Kavk. II, 267.— M. minima Bartal. Cat. piant. Sien. (1776) 61; DC. Prodr. II (1825) 178; Ldb. Fl. Ross. I (1842) 529; Boiss. Fl. Or. II, 103.— M. minima var. vulgaris Urban, Prodr. Monogr. Medicago (1873) 78; Shmal'g., Fl. I (1895) 228.— Ic.: Grossg. (1919) 51; Fl. Tadzhik. V (1937), Plate 13, Fig. 2.— Exs.: HFR No. 1017.

Annual or rarely biennial; stems usually numerous from one taproot, slender, sparingly branched, often prostrate, pubescent; stipules rather large, broad-ovate, acuminate, united at base, the margin entire or with 1 or 2 broadly triangular indentations; leaflets obovate, cuneate at base, 5—10 mm long, dentate at summit, retuse and mucronate, more or less pubescent; corolla 3—5 mm long, yellow; standard rather broad, longer than keel and wings, one and a half times length of calyx; calyx broadly campanulate, usually densely hairy; teeth slender, falcately recurved, acute, longer than tube; pedicels rather slender, densely hairy; bracteoles very small, subulate-lanceolate, shorter than pedicel; raceme 1—3- (rarely up to 8)-flowered; peduncle rather slender, erect, equaling or shorter than the subtending leaf; pod globose in outline, (3) 4—5 mm in diameter, in a spiral 175 of 3—5 turns, mostly sparsely appressed-hairy; veins slender, delicate, arching, unbranched, more numerous than spines; spines numerous, in a double row on the margin, uncinate, deeply sulcate throughout, the groove enlarging toward the base of the spine into a triangular pit, the outer margin without grooves between the spines; seeds few, castaneous, 2—2.5 mm long, reniform-navicular. April—June. (Plate XI, Figure 16).

Dry slopes, mainly on stony or gravelly soil, and waste places, up to 1,200 m.— European part: Transv. (rare), L. V. (rare), L. Don (rare), M. Dnp., Bl., Bes., Crim.; Caucasus: Cisc., W. (rare), Syr D., Pam.-Al., Kara K., Mtn. Turkm. **Gen. distr.**: Scand. (rare), Centr. and Atl. Eur., Med. (E. and W.), Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Abyssinia. Described from S. Europe. Type in London.

Var. 1. **recta** Burnat, Fl. Alp. marit. II (1896) 109.— Spines longer than pod diameter.— European part: Crim.; Cisc., W. and E. Transc.; Centr. Asia: Kara K. (rare).

Var. 2. **brachyodon** Rchb. Fl. Germ. exc. II (1832) 502.— M. meyeri Gruner in Bull. Soc. Nat. Mosc. (1867) 416.— M. inconspicua Nevski in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, No. 4 (1937) 250.— Ic.: Fl. Tadzhik, V (1937), Plate 13, Fig. 6.— Spines shorter than half pod diameter, often very short, always uncinate.— European part: L. Don (rare), Bl. (rare), Crim.; Caucasus: Cisc., E. Transc., Dag.; Centr. Asia: Mtn. Turkm. (Plate XI, Figure 17).

Note. M. minima is a weed of pastures and as such is definitely deleterious.

Section 4. **LANIGERAE** B. Fedtsch. in Bull. Jard. Bot. V, 1 (1905) 41.— Coils of the pod appressed to each other; veins and spines scarcely visible, the pod being densely covered throughout with long white hairs; radicle two-thirds the length of cotyledon.

36. **M. lanigera** C. Winkl. et B. Fedtsch. in Bull. Jard. Bot. V (1905) 41.— Ic.: Fl. Tadzhik. V (1937), Plate 14, Fig. 7.

Annual, sparsely hairy throughout; stipules 1—3-toothed at base, usually uncinately recurved at tip; leaflets slightly pubescent; narrow, oboval-cuneate, in upper part sharply dentate, the lower ones emarginate; corolla very small, light yellow, about as long as calyx; calyx-teeth subulate, longer than tube; peduncles 1-flowered, shorter than the subtending leaf; pod 5—8 mm in diameter, compressed or short-cylindric, in a spiral of 3—4 turns, 6 reticulate-veined, with entire margin, unarmed, densely clothed throughout with long fluffy indument which completely smothers it and imparts to it the spherical shape. June. (Plate X, Figure 6).

Dry stony slopes in the middle mountain zone, at 600—900 m.— Centr. Asia: Pam.-Al., Mtn. Turkm. Endemic. Described from mountainous Bukhara. Type in Leningrad.

Note. Of no value for forage purposes.

Genus 791. MELILOTUS[*] ADANS.[**]

Adans. Fam. II (1763) 322; O.E. Schulz, Monogr. in Engl. Bot. Jahrb. XXIX (1901) 660.— Trifolium melilotus L. Sp. pl. (1753) 765.

Calyx campanulate, 5-toothed; petals distinct, caducous (only in the case of M. hirsutus often persistent in fruit); stamens spuriously monadelphous, 9 filaments being united to two-thirds or three-quarters into a tube, the tenth united with the others only at the middle or completely free (in M. indicus); ovary lanceolate, glabrous or pubescent, 2—8-ovuled, surmounted by a style, this sometimes longer than ovary; pod twice to four times the length of calyx, ovoid, oblongly ovoid-rhomboid or subglobose, glabrous or hairy, reticulate-rugose, plicate-rugose or finely cross-veined, indehiscent or almost indehiscent, falling together with calyx and pedicel; seed 1, rarely 2. More or less fragrant biennial or annual herbs; stems erect; leaves pinnately 3-foliolate, the middle leaflets with fairly long petiolule, the lateral leaflets subsessile; stipules entire, rarely toothed-incised; flowers yellow or white, pedicellate, in many-flowered axillary racemes. Russian name: donnik.

The genus contains altogether some 20 species.

Economic importance. Until recent times, sweet clovers were unjustifiably regarded as weeds. Melilotus officinalis is indeed a serious weed; other species are above all valuable forage plants. Of particular interest in this respect is M. albus which is now well established as a cultivated plant and has already given rise to a number of varieties; economically very valuable is the annual form of this species, introduced from the U.S.A. and now rather widespread in the valleys of small steppe rivers of W. Kazakhstan. Among other species, of special promise for forage use are M. polonicus and M. dentatus; the former distributed on the sands of the Caspian area and deserving large-scale cultivation on sands; the latter, usually growing on saline soils, is suitable for cultivation on soils with a high salt content.

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[*] From Greek meli — honey, and lotos — a name applied to many plants, including certain clovers.

[**] Treatment by E. G. Bobrov.

177 Also, one should not ignore the importance of Melilotus species as honey plants, M. albus ranking particularly high in this respect. This species is widely cultivated in many areas of the U. S. A., where it is highly valued both for its high productivity and the quality of the honey, and constitutes one of the best honey plants of the country.

Note. Considering the difficulties involved in identification of sweet clover, we give two keys to species: Key I, based on pod characters, and Key II, utilizing characters associated with flowers and vegetative parts.

I

1. Pods irregularly reticulate-rugose with anastomosing veins . . . . . 2.
+ Pod transversely veined or plicate . . . . 10.
2. Stipules entire, rarely those of lower leaves incised . . . . 3.
+ Stipules incised-toothed; leaflets finely serrate, with 15–40 teeth on each margin . . . . 1. **M. dentatus** (W. et K.) Pers.
3. Racemes dense, many-flowered; flowers several dozen or, if only about 10, then flowers small, ca. 2.5 mm long . . . . 4.
+ Racemes loose, few-flowered; flowers not more than 10; leaflets leathery, acute, mostly entire . . . . 6. **M. polonicus** L.
4. Ovary and pod glabrous . . . . 5.
+ Ovary and pod hairy, especially when young . . . . 8.
5. Flowers 3–6.5 mm long . . . . 6.
+ Flowers ca. 2.5 (2.2–2.8) mm long; lower stipules sometimes incised . . . . 11. **M. indicus** (L.) All.
6. Flowers white . . . . 7.
+ Flowers yellow . . . . 2. **M. suaveolens** Ldb.
7. Pedicels 1–1.5 mm long . . . . 4. **M. albus** Desr.
+ Pedicels 3–4 mm long, filiform . . . . 5. **M. wolgicus** Poir.
8. Pods oblong, pendent; stipules linear-subulate; biennial plants . . . . 9.
+ Pods subglobose, erect; stipules lanceolate; annual plants . . . . 10. **M. neapolitanus** Ten.
9. Perianth persistent in fruit; pods reticulate-rugose, obovate-oblong . . . . 8. **M. hirsutus** Lipsky.
+ Perianth caducous; pods obscurely reticulate, ovoid-rhomboid . . . . 7. **M. altissimus** Thuill.
178 10. Flowers yellow; ovary glabrous; pod finely transverse-veined . . . . 3. **M. officinalis** (L.) Desr.
+ Flowers white; ovary and pod initially hairy; pod with 2–4 transverse wrinkled striations . . . . 9. **M. tauricus** (M. B.) Ser.

II

1. Median stipules distinctly toothed; leaflets densely serrate . . . . 1. **M. dentatus** (W. et K.) Pers.
+ Median stipules always entire, only the lower ones sometimes toothed . . . . 2.

2. Flowers 2.2–2.8 mm long; lower stipules obscurely toothed . . . . 11. **M. indicus** (L.) All.
+ Flowers 3–7 mm long; stipules always entire . . . . 3.
3. Pedicels 3–5 mm long . . . . 4.
+ Pedicels 1–2 mm long . . . . 5.
4. Racemes dense, 30–50 (80)-flowered . . . . 5. **M. wolgicus** Poir.
+ Racemes loose, 4–10-flowered . . . . 6. **M. polonicus** L.
5. Ovary hairy . . . . 6.
+ Ovary glabrous . . . . 9.
6. Annual plants; stipules lanceolate; pedicels 4–5 mm long, horizontally spreading or erect . . . . 10. **M. neapolitanus** Ten.
+ Biennial plants; stipules subulate; flowers 5–7 mm long . . . . 7.
7. Ovary stipitate; leaflets rounded-cuneate; flowers white . . . . 9. **M. tauricus** (M. B.) Ser.
+ Ovary sessile; leaflets obovate or oblong; flowers golden-yellow or pale yellow . . . . 8.
8. Leaves obovate; ovary densely short-hairy; calyx-teeth subulate . . . . 8. **M. hirsutus** Lipsky.
+ Leaves oblong; ovary puberulent; calyx-teeth lanceolate . . . . 7. **M. altissimus** Thuill.
9. Flowers white . . . . 4. **M. albus** Desr.
+ Flowers yellow . . . . 10.
10. Flowers 5–7 mm long; ovary 4–8-ovuled . . . . 3. **M. officinalis** (L.) Desr.
+ Flowers 4–5 mm long; ovary 2- or 3 (4)-ovuled; very fragrant plants. Far East and E. Siberia . . . . 2. **M. suaveolens** Ldb.

1. **M. dentatus** (W. et K.) Pers. Syn. II (1807) 348; Ldb. Fl. Ross. I, 535; Boiss. Fl. or. II, 108; Shmal'g., Fl. I, 229; Kryl., Fl. Zap. Sib. VII, 1596. — Trifolium dentatum W. et K. Plant. rar. Hung. I (1802) 41. — M. olympicus Hort. et M. kochianus Hayne ex Trautv. in Bull. Sc. Pétersb. VIII (1841) 270. — M. brachystachys Bge. in Arb. Naturf. Ver. Riga I (1848) 219 et in Mém. Sav. Etr. VII (1854) 248. — Ic.: W. et K. l. c. tab. 26; Rchb. Ic. Fl. Germ. XXII (1870) 2131. — Exs.: Fl. pol. exs. No. 919.

Biennial; stems 0.2–1 m long, ascending, branched from base, prominently angled in middle part, glabrous, sparsely appressed-hairy in upper part; stipules 1–1.5 cm long, narrowly lanceolate, incised-dentate toward the dilated base, elongate-acuminate; leaflets oblong-lanceolate, rarely oblong-rhomboid, the upper narrower and obtusish, closely serrulate nearly from the base (15–40 serrations on each margin); leaflets prominently veined at the margins, sometimes covered with appressed short hairs, darker above, glabrous, stiff (in herbarium specimens); raceme before anthesis 1–3–5 cm long, 20–50-flowered; pedicels hairy, ca. 1.5 mm long; flowers nodding, 3–3.5 mm long; calyx ca. 2 mm long, sparingly appressed-hairy, the triangular-lanceolate teeth about as long as tube; corolla pale yellow; standard slightly longer than keel and wings, these subequal; ovary on short curved stipe, glabrous, 2-ovuled; style not longer than ovary; pod 4–5 mm long and 2–2.5 mm broad, obovoid, 2-seeded, glabrous, gently reticulate-rugose with anastomosing veins; seeds ca. 1.5 mm long and broad, greenish yellow. July–September. (Plate XII, Figure 9).

Solonetzes, solonetz meadows, rarely solonchaks and in southern regions, sometimes a weed of ricefields and alfalfa stands.— European part: U. Dnp. (extreme S.), M. Dnp., V.-Don (S.), Transv., V.-Kama (S.), Bes., Bl., L. Don, L. V.; Caucasus: Cisc., Dag., S. and E. Transc., Tal.; W. Siberia: Ob (S. border of the region), U. Tob., Irt., Alt.; E. Siberia: (rare) Ang.-Say., Dau.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K. (Amu Darya Valley and Delta, rare), Syr. D., Amu D. (rare), T. Sh., Pam.-Al. (rare). **Gen. distr.:** Centr. and Atl. Eur., Med. Described from the Banat. Type in Vienna.

Note. Among the varieties admitted by Schul'ts, of special interest is the one described by Bunge as a distinct species, M. brachystachys (l. c.), which differs in the relatively short and few-flowered raceme. This form, fully independent according to Prof. M. G. Popov, occurs widely among irrigated crops of Soviet Central Asia. Since the material at our disposal (authentic specimens from the Bukhara district) is very limited, it does not warrant the establishment of this form as an independent species, the more
180 so since we have seen a good deal of typical M. dentatus from these regions.

In E. Siberia (from Balagansk to Nerchinsk), where M. dentatus is rare, of rather frequent occurrence are specimens which might be defined as hybrids between this species and M. suaveolens Ldb.

M. dentatus (W. et K.) Pers. × M. suaveolens Ldb. hybr. nov.— M. dentatus prol. sibiricus O. E. Schulz, l. c., 689.— Exs.: HFR No. 1214.

Biennial; stipules dentate, sometimes only those of lower leaves; leaflets orbicular, thin, sparsely dentate to entire; flowers somewhat larger than in the preceding species; pod smaller, mostly 1-seeded.

Meadows, mostly solonetzic, rarely dry valleys.— E. Siberia: Ang.-Say., Dau. **Gen. distr.:** Mong. Described as a variety from the Nerchinsk area. Type in Leningrad.

2. **M. suaveolens** Ldb. Ind. Sem. Dorpat. Suppl. II (1824) 5; Ldb. Fl. Ross. I, 536; Turcz. Fl. baic.-dah. I, 278; Kom. Fl. Manchzh. II, 575; Kom. and Alis., Opr. rast. Dal'nevost. kr. II, 662; Kryl., Fl. Zap. Sib. VII, 1600.— Ic.: Kom. and Alis., l. c., tab. 197.

Biennial; stems ca. 50 cm long, rarely somewhat longer, commonly branched, rather slender; stipules subulate, dilated at base, entire or only the lower sometimes with 1 or 2 dentations; leaves unequally denticulate, with 6—11 dentations on each margin, the lower obovate-orbicular, the upper oblanceolate, obtusish; raceme short, dense, 30—40-flowered, strongly elongated and loose in fruit; pedicels somewhat shorter than calyx; flowers ca. 5 mm long; calyx-teeth obtusish, one-third to at most half length of calyx; corolla pale yellow; wings as long as keel and somewhat shorter than standard; ovary 2—4-ovuled; style slightly longer than ovary; pod ca. 4 mm long, 2.5 mm broad, dingy gray, sometimes blackish, glabrous, obscurely reticulate-rugose, commonly 1-seeded; seeds yellowish brown. F. June; fr. August.

Sandy loams and sands, riverbanks, and meadows; rarely cultivated fields.— E. Siberia: Ang.-Say. (E.), Dau., Lena-Kol. (Lena Valley, between Yakutsk and Aldan); Far East: Ze.-Bu., Uda, Uss.; Centr. Asia: Balkh. (Zaisan area), T. Sh. (E. Tekes). **Gen. distr.:** Dzu.-Kash., Mong., Manchuria, Jap.-Ch. Described from Nerchinsk. Type in Leningrad.

Note. Most of the locations reported for this species by Krylov in W. Siberia (Kryl., Fl. Zap. Sib. VII, 1600) should be referred to M. officinalis and only records relating to S. Altai may be accepted as applying to M. suaveolens.

3. **M. officinalis** (L.) Desr. in Lam. Encycl. Meth. IV (1796) 62; Ldb. Fl. Ross. I, 537; Kryl., Fl. Zap. Sib. VII (1933) 1599; Shmal'g., Fl. I, 229. — M. officinalis var. incisa Lipsky in sched. — Trifolium M. officinalis α L. Sp. pl. (1753) 765. — M. petitpierreanus Willd. Enum. 31 Horti Berol. (1809) 791. — M. arvensis Wallr. Sched. crit. (1822) 391; Ldb. Fl. Alt. III, 254. — M. pallidus Besser ex Ser. in DC. Prodr. II (1825) 188; Ldb. Fl. Ross. I, 536. — Ic.: Rchb. Ic. Fl. Germ. XXII (1871) tab. 2130. — Exs.: HFR No. 1111; Herb. Fl. As. Med. No. 257.

Biennial; stems erect, 0.5—1 m long, sometimes longer, hairy in upper part; stipules lanceolate, acuminate, entire, the lowermost sometimes with 1 or 2 dentations; leaflets of lower leaves obovate to orbicular, obtusish, the upper lanceolate, unequally dentate, with 10—13 teeth on each margin, puberulent beneath; raceme 4—10 cm long, 30—70-flowered; pedicels to 1.5 mm long; flowers yellow, nodding, 5—7 mm long; calyx ca. 2 mm long, the triangular-lanceolate teeth half length of calyx; standard about as long as wings, the keel somewhat shorter; ovary lanceolate, glabrous; distinctly stipitate, commonly 6-(rarely 4- or 8)-ovuled; style slightly curved, about one and a half times as long as ovary; pod 3—4 mm long, 2 mm wide, and ca. 1.5 mm thick, ovaloid, obtusish at the top, with persistent style, short-stipitate, grayish, glabrous, transversely wrinkled; seed 1 (rarely 2), greenish yellow. Fl. May—June, fr. June—July. (Plate XII, Figure 1).

Meadows, sometimes solonetzic, cultivated fields, fallows, and roadsides. — European part: all regions, less frequent in the North, distributed to Arkhangel'sk and the Khibiny Mountains, where probably immigrant; Caucasus: all regions; W. Siberia: Ob (S.), U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (extreme W.- Minusinsk); Centr. Asia: all regions except Kyz. K., where occasionally growing only in river valleys. **Gen. distr.**: Centr. and Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Dzu.-Kash., Tib. Described from Europe. Type in the Linnaean Herbarium.

Note. Schul'ts distinguishes within this species a number of varieties and forms. Deserving special attention are some samples from mountainous Dagestan and the Kuba District of Azerbaijan (Akhty, Agri, and Geok-chai) in which the stems are slender, weak, almost prostrate, while the obovate leaflets are rather narrower and tending toward cuneate, often scarcely dentate.

4. **M. albus** Desr. in Lam. Enc. Meth. IV (1796) 63; Ldb. Fl. Ross. I, 536; Kryl., Fl. Zap. Sib. VII, 1597; Shmal'g., Fl. I, 230. — M. vulgaris Willd. Enum. Horti Berol. II (1809) 790; Turcz. Fl. baic.-dahur. I, 278. — M. leucanthus Koch in DC. Fl. Fr. V (1815) 564. — M. melanospermus Besser ex Ser. In DC. Prodr. II (1825) 186; Ldb. Fl. Ross. I, 536. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 2130. — Exs.: Fl. pol. exs. No. 815.

Biennial, rarely annual; stems erect, 0.5—1.5 m long, sometimes slightly 2 reddish in lower part, short-hairy above; stipules subulate, entire, very rarely the lower dentate; obtusish, dentate nearly from base, with 8—12 dentations on each margin, sparingly short-hairy beneath, the lower obovate-rhombic or cuneate, the upper oblong-lanceolate; raceme loose, 4–6 cm long, greatly elongating in fruit; flowers white, 4–5 mm long, on pedicel 1–1.5 mm long; calyx 2 mm long, the lanceolate acuminate teeth half as long as tube; standard slightly longer than wings, these as long as tube; standard slightly longer than wings, these as long as keel; ovary sessile, lanceolate, 3- or 4-ovuled; style one and a half times as long as ovary; pod turning dark, 3–3.5 mm long, 2–2.5 mm broad, and ca. 2 mm thick, somewhat blunted at the top, more or less distinctly reticulate-rugose by rather few slender veins; seeds 1 or 2, rarely 3, yellow, smooth or minutely tuberculate. June–September. (Plate XII, Figure 8).

River flats, riverside thickets on alluvial sands, wet meadows, fallows, chalky slopes, solonetzes, and rarely solonchaks; sometimes becoming a weed; introduced in the taiga zone, where it spread northward along river valleys and railroads. — European part: all regions, in the North: Kar.-Lap. (Petrozavodsk, Khibiny Mountains) and Dv.-Pech. (Arkhangel'sk)— infrequent and occurring as adventive; Caucasus: all regions; W. Siberia: Ob (S. part, to the latitude of Tobol'sk), U. Tob., Irt., Alt. (only W.); E. Siberia: Yenis. (extreme S.), Ang.-Say., Dau. (Selenginsk, Chita), Lena-Kol. (occasionally along the Lena River as far as Yakutsk); Far East: introduced in Ze.-Bu. (Blagoveshchensk area) and Uss. (Russkii Island); Centr. Asia: all regions, both lowland and mountainous, as far as and including Shugnan, but in Kara K. and Kyz. K. only in the valleys of the Amu Darya and Syr Darya rivers.

5. M. **wolgicus** Poir. Enc. Meth. Suppl. III (1813) 648. — Trifolium ruthenicum M. B. Fl. taur.-cauc. III (1819) 506 in textu. — M. ruthenicus Ser. in DC. Prodr. II (1825) 186; Ldb. Fl. Ross. I, 538; Shmal'g., Fl. I, 230. — ? M. laxus Stev. ex Trautv. in Bull. Scient. Ac. St. Pétersb. VIII (1841) 271, nomen. — M. integerrimus Stev. ex Trautv. l. c., nomen.

Biennial; stems erect, sometimes somewhat flexuous, 0.5–1 m long, branched from base, slightly hairy above; stipules entire, subulate, 6–8 mm long; lower leaflets rhombic-oval, with 12–16 sometimes obscure dentations on each margin; upper leaflets oblong-lanceolate, mostly entire; racemes 5–10 cm long, very loose, much elongated in fruit; pedicels slender, filiform, 3–4 mm long, four times as long as bracteoles; flowers horizontally spreading, 3–3.5 mm long; calyx ca. 1 mm long, broadly subulate-toothed to one-quarter or one-third; corolla white, the petals subequal; ovary short-stipitate, glabrous, 2-ovuled; style slightly longer than ovary; pod pendent on
183 arched-recurved stipe, 4–5 mm long and 2.5 mm broad, yellowish brown, reticulate-veined, 1- or 2-seeded; seeds brownish yellow, ca. 2.5 mm long. June–July. (Plate XII, Figure 5).

Southern steppe belt, steppes and steppe slopes, valleys of small steppe rivers and ravines, clayey shore escarpments, pebbles, boggy meadows near springs, estuaries in the Caspian Lowland, solonetzes, and sometimes fallows. — European part: Dv.-Pech. (Arkhangel'sk, introduced), Bl. (vicinity of Kherson, introduced?), L. Don, V.-Don (Kuznetsk, Khvalynsk), Transv. (S.), V.-Kama (extreme S.), L. V.; W. Siberia: U. Tob. (except N.), Irt. (W. — Kokchetav and Atbasar districts); Caucasus: S. Transc. (Ordubad, introduced?). Endemic. Classical location unknown. Type in Paris.

6. M. **polonicus** (L.) Desr. in Lam. Enc. Meth. IV (1796) 66. — Trifolium M. polonicus L. Sp. pl. (1753) 765. — T. polonicum Willd. Sp. pl. III, 2 (1800) 1354. — Melilotus rariflorus Ldb. in Eichw. It. casp.-cauc.

(1833) 7. — M. laxa Stev. ex Trautv. in Bull. Scient. Ac. St. Pétersb. VIII (1841) 271, nomen. — M. caspius Gruner in Bull. Soc. Nat. Mosc. XL, 4 (1867) 418; Boiss. Fl. Or. Suppl., 166. — Ic.: Gruner, l. c. tab. 8. Russian: names: donnik pol'skii, kaspiiskii, ili peschanyi [Polish, Caspian, or Sand sweet-clover].

Biennial; stems erect, 40—70 cm long, robust, yellowish, sparsely leafy, divaricately branched from base, puberulent above; stipules subulate, entire, 6—8 mm long; leaflets 2—6-toothed to subentire, rather thick and leathery, prominently few-veined and appressed-pubescent beneath, the lower obovate, cuneate at base, the upper spatulate or sublanceolate, acuminate, sometimes almost spinescent; racemes ca. 5 cm long, very few-flowered, slightly elongating in fruit; pedicels filiform, 4—5 mm long; bracteoles one-third to half length of pedicel; flowers ca. 6 mm long, with horizontally spreading pedicels; calyx ca. 3 mm long, sparsely pubescent, the acuminate teeth one-third length of calyx; corolla pale yellow, the petals subequal; ovary glabrous, 2-ovuled; style about as long as ovary; pod pendent, 7—8 mm long and ca. 3 mm broad, lanceolate or oblong-rhomboid, yellowish or light brown, rugose by anastomosing veins; seeds solitary or rarely 2, ca. 3 mm long, yellowish brown. Fl. July; fr. August. (Plate XII, Figure 6).

Sands of Caspian Lowland and seashores. — European part: Bl. (sandy islands near Kherson, introduced?), L. V.; Caucasus: Dag., E. Transc., Tal. ?; Centr. Asia: Ar.-Casp. (SW), Kara K. (there is a dubious report for the Turkmenian coast of the Caspian Sea). **Gen. distr.**: Iran, Caspian coast. Described "from Poland." Type in London.

Note. Linnaeus obviously made a mistake in naming the plant and indicating Poland as its native country, since this species is distributed in the Caspian area, while it is unknown within the former limits of Poland. Special publications, devoted to the problem of its distribution (Ö. B. Z. LI (1901) 154; Tr. Yur'evsk. Bot. Sada II (1902) 168, IV (1903) 6), have cast doubt on the occurrence of M. polonicus in former Polish territory and point to its presence in Podolia as unlikely. We consider as reliable only the record referring to lower reaches of the Dnieper below Kherson, where the plant was collected by Sredinskii; it was apparently introduced there, since we do not know of any other records of its distribution in the Black Sea area and we cannot admit extension of the distribution range outside the Caspian area. The first to identify our plant with the Linnaean diagnosis was Gruner (l. c.) who supplied a detailed description and suggested a new name, M. caspicus. While this appellation is very appropriate, it cannot replace the Linnaean name for reasons of priority.

M. officinalis (L.) Desr. X M. polonicus L. — M. scythicus O. E. Schulz in Engl. Bot. Jahrb. XXIX (1901) 708. — M. korshinskii O. E. Schulz in sched. — Leaves entire, acuminate; racemes loose, 5—22-flowered; pedicels ca. 4 mm long; flowers 5.5 mm long, yellow, soon bleaching; ovary stipitate, 2-ovuled; pods smaller than those of M. polonicus, mostly distinctly cross-wrinkled. Flowering and fruiting at end of June—beginning of July.

Sands: European part: L. V. (Ryn Sands). Described from the locality indicated with false identification (M. officinalis X M. wolgicus). Endemic. Type in Leningrad.

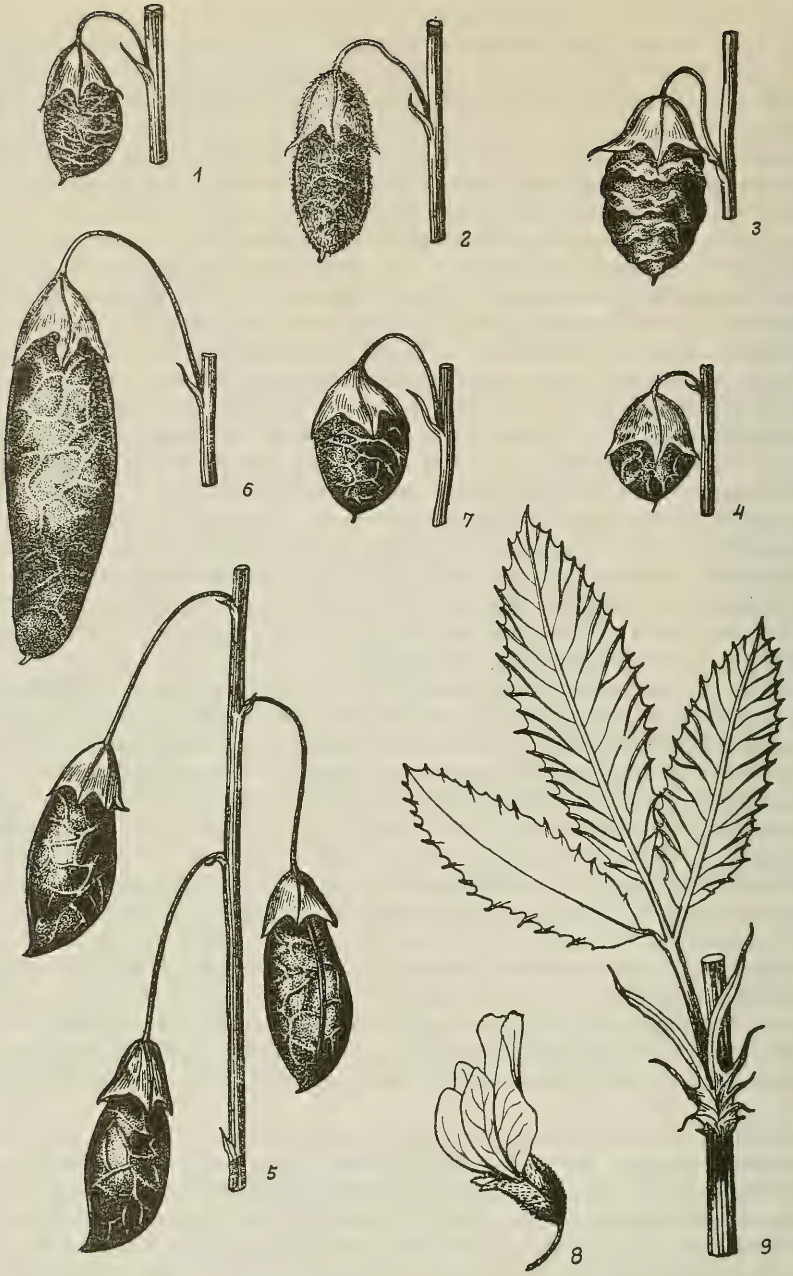

PLATE XII. 1 — Melilotus officinalis (L.) Desr.; 2 — M.altissimus Thuill.; 3 — M. tauricus (M.B.) Ser.; 4 — M.indicus (L.) All.; 5 — M.wolgicus Poir.; 6 — M.polonicus (L.) Desr.; 7 — M.neapolitanus Ten.; 8 — M.albus Desr., flower; 9 — M.dentatus (W.et K.) Pers.

7. **M. altissimus** Thuill. Fl. Par. ed. 2 (1799) 378. — M. macrorrhizus Pers. Syn. II (1807) 348; Ldb. Fl. Ross. I, 535; Shmal'g., Fl. I, 229. — Ic.: Hegi III. Fl. IV, 3 1241; Rchb. Ic. Fl. Germ. XXII, tab. 2131. — Exs.; Fl. austro-hung. No. 23, 428; Schulz, Herb. Norm. 2158.

Biennial; taproot stout; stems 50—150 cm long, virgate, arcuately ascending or erect; stipules subulate, 5—8 mm long, very rarely the lower ones with a short tooth; leaflets tapering toward base, in upper part with 8—20 dentations on each margin, grayish beneath with short appressed hairs or glabrate, the lower obovate, the upper oblong; racemes 2—5 cm long, densely 15—50-flowered; pedicels 1.5—2 mm long, hairy; flowers 5—7 mm long; calyx hairy, ca. 2.5 mm long, the triangular-lanceolate acuminate teeth half the length of calyx; corolla golden-yellow; standard oboval, brown-striped, about as long as wings, these equaling or slightly exceeding the keel; ovary 7 lanceolate, obscurely stipitate, 2- or 3-ovuled; style about as long as to one and a half times as long as ovary, slightly curved; pod pendent, 3.5—5 mm long and 2.5—3 mm broad, rhomboid, compressed along the ventral suture, darkening, sparsely hairy, slightly reticulate with rather faint anastomosing veins; seed solitary or 2, ca. 2 mm long, ferruginous, obscurely tuberculate. July—September. (Plate XII, Figure 2).

Wet meadows and pastures in the SW, introduced in the E. — European part: Lad.-Ilm. (Leningrad, Gutuevskii Island), V.-Kama (S.), U. Dns., M. Dnp. (W.), Bes., V.-Don, Transv., L. V.; W. Siberia: Alt. (Barnaul, Altai). **Gen. distr.**: Atl. and Centr. Eur., W. Med. Described from the vicinity of Paris.

Note. This species occurs very rarely in the USSR and only the locations in the W. part of M. Dnp. enter within the general distribution area, while in the more easterly regions it is probably adventive. As regards records from W. Siberia, these are subject to serious doubt; even in the most recent Flora of W. Siberia (VII (1933) 1595), P. N. Krylov does not mention it, although in an earlier work (Fl. Altaya II (1903) 220) he mentions it on the basis of Ledebour's report (l.c.). We retain here all the references to M. altissimus in W. Siberia, since the Herbarium of the Botanical Institute of the Academy of Sciences contains two specimens of this species from Ledebour's herbarium, annotated Barnaul and Altai, respectively.

8. **M. hirsutus** Lipsky in Zap. Kievsk. Obshch. Estestv. XI, 2 (1891) 43; Lipsky in A. H. P. XIII (1893—1894) 287. — Exs.: Herb. Fl. cauc. No. 225.

Biennial; stem erect, strict, 0.6—1 m long or longer, covered with short appressed hairs, especially in upper part; stipules linear-subulate, entire; leaflets short-petioluled, with short appressed hairs beneath, less hairy above, sometimes subglabrous, in upper part with 8—10 sometimes obscure dentations on each margin, the lower obovate to suborbicular, the upper oblong and relatively narrower; raceme 3—4 cm long, hairy, densely flowered, later elongating; flowers ca. 5 mm long; calyx toothed to the middle, hairy like the pedicel; corolla pale yellow; standard, wing, and keel equal in length; ovary densely short-hairy, lanceolate, 2-ovuled; style one and a half times as long as ovary; pod ca. 6 mm long, 2.3 mm broad, and 1.5 mm thick, hairy, tapering toward summit, obovoid-oblong, short-stipitate, from base to the middle almost 4-angled, reticulate-rugose, hirsute, bearing persistent corolla parts; seeds smooth. Fl. June; fr. July.

188 Coastal cliffs and riverine pebbles. — Caucasus: Cisc. (SW), W. Transc. (from Anapa to Tsebel'da). Endemic. Described from the vicinity of Novorossiisk. Type in Leningrad.

9. **M. tauricus** (M. B.) Ser. in DC. Prodr. II (1825) 188; Ldb. Fl. Ross. I, 539; Shmal'g., Fl. I, 229. — Trifolium M. tauricum M. B. Fl. taur.-cauc. III (1819) 506. — M. besserianus Ser. in DC. l. c. — M. plicatus Stev. ex Ser. in DC. l. c. — M. imbricatus Ser. in DC. l. c. — M. glaucescens Godet ex Stev. Verz. Taur. Halbins. (1857) 112, nomen in textu. — Exs.: Sintenis It. or. 1892, No. 4218 sub nom. M. albo Desr.

Biennial, rarely annual, light green or glaucous; stems erect, branched, 30—80 cm long, glabrous or slightly hairy; stipules subulate, entire, very rarely the lower toothed at base; leaflets in upper part with 8—12 dentations on each margin, entire below, the lower rhombic, obovate or rounded-cuneate, the upper oblong or cuneate, obtusish; racemes 5—10 cm long, loose, greatly elongating in fruit; flowers 5—6 (7) mm long, pendent; calyx ca. 3 mm long, hairy, the lanceolate-linear teeth half length of calyx; corolla white, the parts subequal; ovary stipitate, hairy, 2-ovuled; style twice as long as ovary; pod slightly hairy at first, finally glabrous, 4—7 mm long, light brown, plicate-rugose; seed 1, rarely 2, light brown, ca. 2.5 mm long. June—July. (Plate XII, Figure 3).

Mountain slopes, taluses, thickets, glades, coastal cliffs, sometimes vineyards. — European part: Crim. (S. coast), also known from Simferopol' and Kerch. **Gen. distr.**: Asia Minor (Anatolia, Paphlagonia). Described from the Crimea. Type in Leningrad.

10. **M. neapolitanus** Ten. Fl. Nap. Prodr. I (1811—1815) p. LXII; Boiss. Fl. or. II, 108, p. p.; Shmal'g., Fl. I, 228. — M. gracilis DC. Fl. Fr. VI (1815) 565; Ldb. Fl. Ross. I, 539. — M. parviflorus Stev. ex Trautv. in Bull. Sc. Ac. Pétersb. VIII (1841) 271, nom., non Desf. (1800). — M. globulosus Stev. in Bull. Soc. Nat. Mosc. XXIX, 3 (1856) 133, in textu. — M. microcarpa C. A. M. in sched. — Ic.: Ten. Fl. Nap. I (1836) tab. 176; Rchb. Ic. Fl. Germ. XXII, tab. 2199. — Exs.: Fl. cauc. exs. No. 311.

Annual; stems erect, branched, 15—40 cm long, pubescent especially at summit; stipules 3—4 mm long, lanceolate, acuminate, entire; leaflets in upper part with 4—6 dentations, often obscure, on each margin, sometimes hairy beneath, the lower rounded-cuneate, the upper oblong-cuneate, obtusish; racemes 1—2 cm long, rather dense, 5—15-flowered, elongating in fruit to 2—3 cm; pedicels ca. 1 mm long; flowers light yellow, horizontally spreading, 4—5 mm long; calyx 2 mm long, slender, hairy nearly to the middle, the teeth
189 acuminate; corolla parts subequal; ovary broadly lanceolate, sessile, appressed-puberulent, 2-ovuled; style three times as long as ovary; pod glabrous, ca. 3 mm long and broad, erect, globose, terminating in a beak 0.6—0.8 mm long, at first reticulate with anastomosing veins, finally irregularly pitted-rugose; seed 1, rarely 2, ca. 2 mm long, brown, sometimes finely tuberculate. Fl. May; fr. June. (Plate XII, Figure 7).

Thickets on mountain slopes, juniper groves, and roadsides. — European part: Crim.; Caucasus: E. and S. Transc. **Gen. distr.**: W. and E. Med., Bal.-As. Min., Arm.-Kurd. Described from S. Italy.

11. **M. indicus** (L.) All. Fl. Pedem. I (1785) 308; Grossg., Fl. Kavk. II, 268. — Trifolium M. indicus L. Sp. pl. (1753) 765. — Melilotus parviflorus Desf. Fl. Atl. II (1800) 192; Ldb. Fl. Ross. I, 538; Boiss. Fl. Or. II, 108. — M. polonicus Ser. in DC. Prodr. II (1825) 187, non Desr. — Ic.: Rchb. Ic. Fl. Germ. XXII (1870) tab. 2127. — Exs.: Herb. Fl. As. Med. No. 256.

Annual; stems erect or flexuous, 15—50 cm long, puberulent in upper part, branched from base; stipules 4—6 mm long, dilated at base, lanceolate, the lower obscurely 1- or 2-toothed; leaflets sparingly pubescent beneath, in upper two-thirds obscurely 5—9-toothed on each margin, the lower obovate-cuneate, the upper oblong-cuneate; raceme 1—3 cm long, densely flowered, in fruit to 5 cm long; pedicels 0.5—1 mm long; flowers horizontally spreading, ca. 2.2—2.8 mm long, yellowish or later almost white; calyx 1—1.5 mm long, the lanceolate obtusish teeth half length of calyx; standard as long as keel and slightly longer than wings; ovary glabrous, subsessile, 2-ovuled; style one and a half times as long as ovary; pod ca. 2 mm long, yellowish brown, subglobose, at first with flexuous transverse veins, finally pitted; seed 1, very rarely 2, ca. 1.5 mm long, yellowish brown, finely tuberculate. Fl. April; Fr. May—June. (Plate XII, Figure 4).

Irrigated fields, irrigation ditches, springs, near water in river valleys, and on seaside sands. — Caucasus: Dag. (Derbent), E. Transc. (E.); Centr. Asia: Mtn. Turkm. (Ashkhabad, Bagir, Kushka), Pam.-Al. (SW). **Gen. distr.**: Med. (from the Canary Islands to India), introduced in the southern hemisphere, in the tropics, and in N. America. Described from India. Type in London.

Genus 792. **TRIFOLIUM** * L.**

L. Gen. pl. ed. 5 (1754) 337.

Inflorescence capitate, rarely racemose or umbellate, the axillary peduncles often apparently terminal; flowers all fertile or rarely the inner ones sterile; corolla white or various shades of red, often yellow; bracteoles present, sometimes united into an involucre subtending the head, or absent; calyx campanulate or tubular, regular or more or less bilabiate, 5-toothed; calyx 5- or 10-nerved, rarely 20-nerved, very rarely with an indefinite number of nerves, sometimes accrescent in fruit, the throat open or constricted by callosities, sometimes chinklike, often with a ring of hairs; corolla commonly persistent in fruit, mostly marcescent, the four lower petals with more or less united claws, the standard often free or nearly so; 9 stamens united into a tube, the tenth free, the filaments usually dilated at summit; ovary sessile, rarely stipitate, 2—8-ovuled; pod coriaceous, obovoid or linear, scarcely dehiscent, sometimes exserted from calyx and corolla, 1- or 2-seeded, rarely 3—6-seeded. Small or medium-sized, perennial or annuals herbs; stems ascending or erect, rarely procumbent and rooting at nodes, very rarely the plant acaulescent; leaves 3-foliolate, rarely 5—9-foliolate; stipules adnate to petiole for most of their length. Plants cross-pollinated as a rule. Russian name: klever.

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* Name used by Pliny and other ancient authors, alluding to the trifoliolate leaves.

** Treatment by E.G.Bobrov.

The genus contains some 300 species, distributed through the temperate and subtropical regions of the northern hemisphere. A small number of species occurs also in the mountains of Central and South America, in the Cape Province, and in the mountains of tropical Africa.

Note. The classification of the genus Trifolium has been thoroughly worked out; it will suffice to point out that our species have been classified under twelve sections. This makes it possible to refrain here from presentation of our clovers in series and thus arrive at a more concise review. Otherwise it would be necessary to present the characters of more than thirty series and to refer to more than fifty species that are strangers to our flora. We have presented all this information in a separate study — "Vidy kleverov SSSR" [Clover Species of the USSR].

1. Flowers bracteolate; throat of calyx open, naked; pod 2–6-seeded, rarely 1-seeded (Subgenus Trifoliastrum) . . . . 2.
+ Flowers ebracteolate; throat of calyx covered by a ring of hairs or callous or contracted to a chink; pod 1- or rarely 2-seeded (Subgenus Lagopus) . . . . 34.
2. Calyx regular or, if bilabiate, never 1-sidedly inflated in fruit . . . . 3.
+ Calyx bilabiate, the upper lip finally bladdery-inflated (Section Galearia) . . . . 28.
3. Bracteoles of outer flowers in the head more or less united, forming a small, much incised or toothed, scarious involucre . . . . 4.
191 + All bracteoles distinct . . . . 8.
4. Involucre very short, consisting of very small bracteoles more or less united at base (Section Lupinaster) . . . . 5.
+ Involucre large, umbelliform, the large fused bracteoles distinct only at tips, sometimes surpassing the flower (Section Involucraria) . . . . 1. **T. cyathiferum** Lindl.
5. Stems leafy, the leafless bases bearing membranous stipule sheaths . . . . 6.
+ Plants acaulescent, with a scape and radical leaves; leaves of 5–7(9) leaflets, the petiole several times length of stipule . . . . 5. **T. polyphyllum** C. A. M.
6. Stems erect; leaves 5-foliolate (very rarely the lower 3-foliolate), short-petioled, the petioles united throughout with stipule . . . . 7.
+ Stems procumbent; leaves 3-foliolate; stipules not fully united with petiole . . . . 4. **T. eximium** Steph.
7. Leaflets lanceolate, with ratio of breadth to length $^1/_6$–$^1/_{10}$, broadest at or below the middle . . . . 2. **T. lupinaster** L.
+ Leaflets obovate-lanceolate to oblanceolate, with ratio of breadth to length $^1/_3$ – $^1/_4$, broadest in upper third or quarter . . . . 3. **P. pacificum** Bobr.
8. Fruiting calyx regularly inflated, the principal nerves connected by transverse nerves, hence tube reticulate; standard free; petals marked by longitudinal nerves (Section Mistylus) . . . . 19.
+ Fruiting calyx not bladdery-inflated . . . . 9.

9. Pod 1–6-seeded, sessile or obsoletely stipitate; calyx 10-nerved, rarely 5-nerved (T. hybridum L.); flowers white to purple, rarely yellowish; bracteoles distinct, scarious, lanceolate . . . . 10.

+ Pod 1-seeded, stipitate; calyx 5-nerved; flowers yellow, rarely purple, not marcescent; bracteoles obsolescent, merely consisting of several cells (Section Chronosemium) . . . . 20.

10. Perennials, rarely annuals (T. angulatum); calyx-teeth erect, not recurved in fruit; pod coriaceous, three to five times as long as broad (Section Amoria) . . . . 11.

+ Annuals; calyx-teeth 3-nerved, recurved in fruit; pod scarious, barely twice as long as broad . . . . 17.

11. Heads ovoid or ellipsoid, compact; pedicels commonly one-fifth to one-third length of calyx, somewhat patent in fruit . . . . 12.

+ Heads globose, loose; pedicels about as long as or even longer than calyx, rarely half as long, nodding in fruit . . . . 14.

12. Stems erect or briefly ascending; leaflets coriaceous, lanceolate to oblong-elliptic; flowers white, finally yellowing . . . . 13.

+ Stems ascending; leaflets soft, broad-elliptic, quite glabrous; flowers white, finally turning pinkish or red . . . . 8. **T. ambiguum** M. B.

13. Plant glabrous or with slight pubescence confined to upper part of stem, underside of leaf veins, and petioles; flowers 12–15 mm long; bracteoles lanceolate, three to five times length of pedicel . . . . 6. **T. bordzilowskyi** Grossh.

+ Plant densely appressed-hairy; flowers 7–8 mm long; bracteoles lance-subulate, barely exceeding pedicel . . . . 7. **T. montanum** L.

14. Plant almost acaulescent, or stem 2–4 cm long and leaves radical; flower-heads to 3 cm in diameter; flowers 12–17 mm long . . . . 9. **T. elisabethae** Grossh.

+ Stems well developed, at least the lateral ones; flower-heads not more than 2 cm in diameter (except cultivated ladino clover, where heads to 3 cm); flowers 5–10 mm long (in ladino clover to 12 mm) . . . . . 15.

15. Stems procumbent, rooting at nodes, only in upper part ascending; flowers white, sometimes turning yellowish or greenish, very rarely suffused with pale pink . . . . 10. **T. repens** L.

+ Stems erect or briefly ascending, not rooting at nodes; flowers pale pink or reddish . . . . 16.

16. Perennials, rarely biennials, sparsely branched; leaflets oval to broad-elliptic, 1.5–3 cm long . . . . 11. **T. hybridum** L.

+ Annuals, branched from base; leaflets cuneate or obovate to oblanceolate, 0.8–1.8 cm long . . . . 12. **T. angulatum** W. et K.

17. Heads on peduncles 1–2.5 cm long; fruiting pedicels nodding; bracteoles about half length of calyx-tube; calyx hairy, the teeth about as long as the tube, the upper ones somewhat longer than the lower . . . . 13. **T. parviflorum** Ehrh.

+ Heads sessile; flowers sessile; bracteoles always less than half length of calyx-tube; calyx glabrous, the subequal teeth shorter than tube . . . . 18.

18. Stems 8–20 (30) cm long, divaricate or erect; calyx-teeth half as long as tube, acuminate from a broad base, twice as long as keel . . . . 14. **T. glomeratum** L.

+ Tufted dwarf plants with simple stems 2–8 (10) cm long, bearing congested flower-heads; calyx-teeth lanceolate, acuminate; corolla shorter than calyx-teeth; wings shorter than keel . . . . 15. T. **suffocatum** L.

19. Calyx-teeth one-quarter to half as long as tube; fruiting calyx inflated, broadly conical; corolla exceeding calyx by not more than one-third; limb of standard at most half as long as the claw . . . . 16. T. **spumosum** L.

+ Calyx-teeth about as long as tube; fruiting calyx inflated, pyriform; corolla twice as long as calyx; limb of standard twice as long as the claw . . . . 17. T. **vesiculosum** Savi.

20. All cauline leaves alternate; all flowers heads borne on axillary peduncles; corolla after flowering light brown, rarely violet in middle part . . . . 23.

+ Upper cauline leaves subopposite; upper flower-heads terminal; corolla dark brown after flowering . . . . 21.

21. Inflorescence loose, 4–11-flowered; corolla 8–10 mm long, with few faint slender nerves; stipe at least three times as long as the pod. . . . . 18. T. **stipitatum** Boiss. et Bal.

+ Inflorescence compact, many-flowered, 1.5–2 cm long; corolla 6–8 mm long, prominently nerved; stipe very short . . . . 22.

22. Inflorescence ovaloid or globose, 1.5–2 cm long and broad; flowers reddish- or lilac-yellow, becoming yellowish brown . . . . 19. T. **rytidosemium** Boiss. et Hohen.

+ Inflorescence ovoid, elongating to short-cylindric, up to 2 cm long and 10–12 mm broad; flowers at first golden-yellow, becoming brownish and finally shining dark castaneous . . . . 20. T. **spadiceum** L.

23. Standard violet, 6–8 mm long, narrowing to a carinate claw, the flabellately rounded limb 5–8 mm broad, the margins almost fringed; corolla in fruit intensely violet-brown at the middle . . . . 21. T. **speciosum** Willd.

+ Corolla light yellow or golden-yellow, in fruit yellowish brown or rarely reddish brown . . . . 24.

24. Flower-heads loose, 3–16-flowered; corolla at anthesis light yellow . . . . 26.

+ Flower-heads compact, 20–40-flowered; corolla golden-yellow . . . . 25.

25. Leaves several times as long as the asymmetrically ovate stipules;
194 terminal leaflet removed some 3–7 mm from the lateral ones, hence
its petiolule apparently longer . . . . 23. T. **campestre** Schreb.

+ Stipules elongate-lanceolate, covering about half the leaf petiole; all petiolules equal, very short . . . . 22. T. **strepens** Crantz.

26. Standard broadly obovate to suborbicular; corolla finally reddish brown, rather prominently nerved; leaflets with 15–25 pairs of veins . . . . 24. T. **sebastiani** Savi.

+ Standard navicular, with a minute claw; corolla finally yellowish brown, almost smooth; leaflets with 6–8 pairs of veins . . . . 27.

27. Stipules rounded at base, the median one-quarter to half the length of petiole; heads 5–15-flowered . . . . 25. T. **dubium** Sibth.

+ Stipules oblong, the median about equaling petiole; heads 3–8-flowered . . . . 26. **T. micranthum** Viv.

28. Bracteoles of lower flowers large, sometimes even exceeding calyx, green, foliaceous, forming an involucre . . . . 29.

+ Bracteoles of lower flowers small, scarious, sometimes crowded and forming a very small scarious involucre . . . . 30.

29. Fruiting calyx 4–6 mm long, the persistent corolla always exceeding calyx by 2–2.5 mm; fruiting heads oblong; flowering calyx 3.5–4 mm long, the teeth not longer than tube . . . . 27. **T. neglectum** C. A. M.

+ Fruiting calyx 8–10 mm long, not exceeded by the persistent corolla; fruiting heads globose; calyx at anthesis 4–5.5 mm long, the teeth longer than tube . . . . 28. **T. fragiferum** L.

30. Flowers not resupinate; the scarious lower bracteoles not forming an involucre. Perennials . . . . 31.

+ Flowers resupinate; the scarious lower bracteoles approximate and apparently forming an involucre. Annuals . . . . 33.

31. Stems well developed . . . . 32.

+ Plants forming a small tuft; stems 2–3–4 cm long, covered by long 5 scarious stipules; heads borne on axillary peduncles 5–9 cm long; flowers 10–12 mm long; fruiting calyx inflated, 7–9 mm in diameter, reddish brown . . . . 30. **T. raddeanum** Trautv.

32. Heads loose, 10–13 mm in diameter, hemispherical at anthesis; flowers 7–8 mm long; corolla pink . . . . 29. **T. physodes** Stev.

+ Heads compact, 2–2.5 cm long, globose at anthesis; flowers 11–14 mm long; corolla yellow or pinkish yellow . . . . 31. **T. tumens** Stev.

33. Peduncles greatly exceeding leaves; fruiting calyx bladdery, scarious, hairy, reticulate, 2-awned by forward-spreading upper teeth . . . . 32. **T. resupinatum** L. s. l.

+ Peduncles not exceeding leaves; fruiting calyx bladdery, scarious, densely pannose and hence its reticulation scarcely evident, the frontal teeth deflexed and hidden by the dense indument . . . . 33. **T. tomentosum** L.

34. All flowers in the head equal and fertile . . . . 35.

+ Outer flowers in the head with normally developed corolla and fertile, the inner developing later, destitute of corolla and sterile (Section Calycomorphum) . . . . 65. **T. subterraneum** L.

35. Fruiting calyx contracted at throat by callosities or contracted to a chink; calyx-teeth commonly stellate, exposing the throat . . . . . . 36.

+ Fruiting calyx not callous and not contracted, the open throat hairy, sometimes with an annular epidermal fold . . . . 51.

36. Throat of calyx contracted to a chink . . . . 37.

+ Throat of calyx with an annular or oval constriction, rarely concealed by dense hairiness of the callosity . . . . 46.

37. Perennials; flowers 15–28 mm long; corolla pale yellow, caducous, the petals united into a long tube, the limbs of keel and wings loosely coherent above the auricle of the wings; pod cartilaginous at summit . . . . 38.

+ Annuals; flowers 6–14 mm long; corolla commonly pink; limbs of keel and wings usually free . . . . 42.

38. Leaflets ovate or obovate, emarginate, apparently striate by numerous lateral veins; standard ligulate, notched at the obtuse apex . . . . 34. **T. canescens** Willd.

196 + Leaflets oblong-ovate or elliptic to lanceolate; standard oblong-ligulate, acuminate or narrowly long-acuminate . . . . 39.

39. Flowers 25–28 mm long; calyx-tube faintly nerved, the teeth linear-subulate . . . . 40.

+ Flowers 15–20 mm long; calyx-tube ribbed by prominent nerves, the teeth narrowly lanceolate . . . . 41.

40. Calyx-teeth obtusish to subtruncate; stipules in free portion triangular-lanceolate (Caucasus) . . . . 35. **T. trichocephalum** M. B.

+ Calyx-teeth spinous-tipped; stipules in free portion linear (W. Ukraine) . . . . 36. **T. pannonicum** Jacq.

41. Calyx-teeth 3-nerved, as long as or slightly longer than tube, the lower at least twice as long (Caucasus, Crimea) . . . . 37. **T. caucasicum** Tausch.

+ Calyx-teeth 1-nerved (the lower sometimes 3-nerved), shorter than tube except the lower, this about one-third, longer than the others and as long as tube (W. Ukraine) . . . . 38. **T. ochroleucum** Huds.

42. Calyx-tube glabrate, coriaceous, pale yellowish; wings shorter than keel . . . . 39. **T. maritimum** Huds.

+ Calyx-tube villous or hairy, lighter-colored than the teeth; wings as long as or longer than keel . . . . 47.

43. Two upper calyx-teeth somewhat connate, hence calyx apparently less incised between them; wings equaling keel . . . . 44.

+ All indentations of calyx equal; wings always at least slightly exceeding keel . . . . 45.

44. Stems patulous-hairy; calyx-teeth slightly longer than tube, the lowest scarcely longer than the upper ones . . . . 40. **T. leucanthum** M.B.

+ Stems appressed-hairy; upper calyx-teeth as long as tube, the lowest twice as long and broad as the upper ones . . . . . 41. **T. squarrosum** L.

45. Corolla twice as long as calyx; leaves oblong-obovate; heads conical or ovoid . . . . 42. **T. echinatum** M. B.

+ Corolla exceeding calyx-teeth by 2–3 mm; leaves linear to linear-lanceolate; inflorescence large, spicate . . . . . . 43. **T. angustifolium** L.

197 46. Throat of calyx annulary contracted or callous-oval . . . . 47.

+ Throat of calyx almost closed with dense hairs; heads globose; flowers ca. 10 mm long; leaflets cuneate-obovate . . . . 44. **T. stellatum** L.

47. Inflorescence 2–4 (6) cm long; flowers 10–12 mm long; corolla longer than calyx; calyx-teeth longer than and up to twice as long as tube, sublinear . . . . 48.

+ Inflorescence to 2.5 cm long; flowers 6–7 mm long, shorter than calyx-teeth, these as long as tube . . . . 49.

48. Flowers intensely carneous, calyx-teeth slightly longer than tube. Cultivated plants; stems stout, commonly solitary and simple . . . . 46. **T. incarnatum** L.

+ Flowers yellowish or pinkish; calyx-teeth much longer than tube. Wild plants; stems more slender; inflorescence less dense (S. Crimea) . . . . 45. **T. molineri** Balb.

49. Calyx-teeth narrowly triangular at summit, scarious-margined at the dilated base; fruiting heads cylindric, compact, to 2.5 cm long . . . . 47. **T. phleoides** Pourr.

+ Calyx-teeth lanceolate to lance-subulate, not scarious-margined at base; heads loose, few-flowered, to 1.5 cm long . . . . 50.

50. Lateral veins of leaflets arched-recurved and thickened toward the margin; calyx coriaceous, with subcylindric prominently nerved tube, indurated in fruit . . . . 48. **T. scabrum** L.

+ Lateral veins of leaflets straight, not recurved and not thickened at margin; calyx almost ribbed by very prominent nerves . . . . 49. **T. striatum** L.

51. Perennial, bi- or triennialplants, very rarely annual (T. diffusum Ehrh.); corolla usually persistent; flowers in various shades of purple, very rarely yellowish (T. borysthenicum Grun.) . . . . . 52.

+ Annual plants; corolla mostly caducous; flowers yellow or pink, rarely purple (T. hirtum All.) . . . . 61.

52. Standard scarcely longer than wings and keel . . . . 53.

+ Standard much longer than wings and keel . . . . 55.

53. Calyx 20-nerved . . . . 54.

+ Calyx 10-nerved, very rarely in some flowers 12–20-nerved . . . . 50. **T. medium** L.

54. Plant hairy, stipules hairy, subulate in free part; calyx-tube hairy. . . . . 51. **T. alpestre** L.

+ Plant glabrous, stipules glabrous, triangular-lanceolate in free part; calyx-tube glabrous . . . . 52. **T. rubens** L.

55. Upper calyx-teeth as long as tube or even somewhat shorter; corolla almost twice as long as teeth . . . . 56.

+ Upper calyx-teeth at least twice as long as tube and even longer, corolla as long as or shorter than calyx-teeth . . . . 59. **T. diffusum** L.

56. Stipules oblong, almost equally broad throughout the length, gradually acuminate; leaflets oblong-obovate to lanceolate, 3–4 cm long and up to 1.5 cm broad . . . . 54. **T. expansum** W. and K.

+ Stipules ovate, attenuate-acuminate at tips; leaflets ovate or broadly obovate to orbicular, less large . . . . 57.

57. Wild growing plant, relatively abundantly pubescent below stem nodes and inflorescences; stems thin, 20–40 cm high, few, usually ascending . . . . 58.

+ Cultivated, slightly pubescent or almost glabrous plant; stems thick, often hollow, 40–70 cm high and above, usually erect . . . . 58. **T. sativum** Grome.

58. Flowers usually purple, rarely white (albinism); stems relatively rigid and appressed-hairy below nodes and head . . . . 59.

+ Flowers yellowish white or pinkish; plant with abundant soft remote hairs below stem nodes and above (S. Ukraine) . . . . 55. **T. borysthenicum** Gruner.

59. Flowers intense purple; calyx-tube wide; limb of standard almost as long as claw; upper parts of internodes, leaf petioles, and leaflets covered by white appressed hairs (subalpine region of the Main Caucasus Range) . . . . 56. **T. fontanum** Bobr.

+ Calyx-tube narrower; limb of standard considerably shorter than claw . . . . 60.

60. Plant with few leaves, grayish due to abundant pubescence; leaflets small, narrower (almost lanceolate); heads loose, relatively small (W. Pamir-Alai). . . . . 57. **T. seravschanicum** Ovcz.
+ Plant with abundant leaves; green, with pubescent internodes and almost glabrous leaves, heads more dense and large (plants of lowlands and foothills of forest and forest-steppe regions of the USSR) . . . . 53. **T. pratense** L.
61. Calyx with 20 and more veins . . . . 62.
199 + Calyx with 10 veins . . . . 63.
62. Calyx-tube glabrous outside; teeth broad at base with 4–5 prominent veins; corolla pinkish and as long as calyx-teeth; standard cuneate, truncate above . . . . 63. **T. lappaceum** L.
+ Calyx-tube densely hairy outside; teeth linear-subulate; corolla purple; standard considerably longer than calyx-teeth, ensiform, acuminate . . . . 62. **T. hirtum** All.
63. Corolla shorter than calyx-teeth, pale pink; standard with claw in almost free . . . . 64. **T. arvense** L.
+ Corolla longer than calyx-teeth, yellow, fused into long tube . . . . . 64.
64. Calyx with very prominent veins; teeth narrow, with one vein, not spiny; standard 14–15 mm long . . . . 60. **T. apertum** Bobr.
+ Calyx with indistinct veins; teeth triangular-subulate, with 3 veins at base, spiny at the end; standard 11–12 mm long . . . . 61. **T. alexandrinum** L.

Subgenus 1. **TRIFOLIASTRUM** Ser. in DC. Prodr. II (1825) 198; Lojac. in Nouv. Giorn. bot. Ital. XV (1883) 226. – Flowers with large, rarely with indistinct bracts; calyx with open throat; pod with 2–6 seeds, very rarely with one seed.

Section 1. INVOLUCRARIA Hook. Fl. Bor.-Amer. I (1840) 132. Bracts concrescent, forming an umbraculiform involucre below the head. Several dozen American clover species belong to this section.

Note. This section is placed here for practical reasons; its actual place is in the series of American sections after Lupinaster.

1. **T. cyathiferum** Lindl. in Bot. Reg. (1827) sub tab. 1070; Hook. Fl. Bor. Am. I (1840) 133. – Ic.: Hook. l. c. tab. 50.

Annual; stems 10–35 cm high, almost procumbent or ascending, weak, branching, glabrous; stipules suborbicular, 3–5 mm long, scarious at base, toothed at margin; leaves long-petioled, ternate, glabrous; leaflets obovate-cuneate to elliptic, sometimes subacuminate, indistinctly toothed; heads axillary, the terminal on 3–7 cm long pedicels; involucre of head large, cup-shaped, light green, almost white at base, incised at the margin into broad toothed segments, with abundant longitudinal veins and almost reticulate owing to transverse veins; head with 5–12 flowers; calyx scarious, light-colored, very finely reticulate due to nerves, somewhat inflated, the tube almost as long as teeth; teeth hispid, divaricate, 3–4-partite; corolla pale pink; standard free, widened at base, slightly clawed; 200 wings somewhat shorter; style filiform; pod ovoid-oblong, compressed, dehiscent, 2-seeded; seeds compressed, globose, smooth. August.

Arctic: Chuk. (in St. Nicolas Bay near mouth of Anadyr River, beside the station building). **Gen. distr.**: western states of America (Washington, Oregon, California, Nevada). Described by specimens grown from seeds collected in the Columbia River basin. Type in London.

Note. Undoubtedly introduced; this is the unique representative of the numerous species of the American section Involucraria.

Section 2. **LUPINASTER** Link, Enum. II (1822) 260; Belli in Mém. Ac. Torino, sér. 2, XLIV, 233; Herm. in Fedde Repert. XLIII, 316; Adans. Fam. II (1763) 323, pro gen.; Moench, Meth. Suppl. 50.— Calyx with open throat and equal or subequal teeth; standard free; ovary linear, 2—8-ovuled; pod linear, 2—6-seeded; heads somewhat 1-sided or umbellate, loose, with a scant scarious involucre; flowers large, 1.2—2.5 cm long; leaves 3—5—7(9)-foliolate, prominently veined. Perennials.

2. **T. lupinaster** L. Sp. pl. (1753) 766; DC. Prodr. II, 204; Ldb. Fl. Alt. III, 258; Ej. Fl. Ross. I, 551; Turcz. Fl. baic.-dahur. I, 283; Shmal'g., Fl. I, 245; Kom., Fl. Manchzh. II, 577; Kryl., Fl. Zap. Sib. VII, 1605.— Lupinaster pentaphyllus Moench, Meth. Suppl. (1802) 50.— L. purpurascens Fisch. ex DC. Prodr. II (1825) 204.— Pentaphyllon lupinaster Pers. Syn. II (1807) 352.— Pentaphyllum ammani Ldb. Ind. Sem. Dorp. Suppl. (1823) 5.— Trifolium lupinaster γ oblongifolium Seringe in DC. l. c., non Vierh.— T. lup. β purpurascens Ldb. Fl. Alt. III (1831) 258; Vierh. in O. B. Z. XLVII (1918) 258.— Ic.: Buxb. in Comment. Ac. Petrop. II, tab: 20; Gmel. Fl. Sib. IV, tab. 6; Rchb. Ic. Fl. Germ. XXII, tab. 81; Belli in Mem. Acad. Sc. Torino, ser. II, XLIV, 290, tab. 1.— tab. 1.— Exs.: HFR No. 1320, a, b.

Perennial; taproot fusiform, branched; stems erect, simple, rarely branched, 15—50 cm long, smooth or only in upper part pubescent, the lower part leafless and covered with long membranous sheathing stipules; petioles short, appressed to stem and united throughout with membranous stipules, the lanceolate tips of stipules also appressed to stem; leaves 5-foliolate, rarely 6-foliolate, the lower 3-foliolate, lanceolate, appressed-hairy on the midrib beneath, serrulate, prominently veined, 3—5 cm long and 0.5—2 cm broad; heads 1-sided, umbellate, 1—6 on a common pubescent peduncle 1—5 cm long, subtended by a short membranous involucre; pedicels filiform, 1.5—2 mm long; calyx 6—8 mm long, hairy; teeth half or somewhat more than half the length of calyx, subequal, subulate or lanceolate, hairy; corolla yellowish white (var.) or rose to lilac-purple, (10) 12—17 mm long; standard 12—17 mm long, 8—9 mm broad, elliptic, cuneate at base, slightly longer than keel and wings; ovary 5—8-ovuled; pod 3—6-seeded. Fl. end of June; fr. July—August. (Plate XIII).

Forest-steppe, S. part of forest and N. part of steppe zones, mostly in areas dominated by open coniferous and small-leaved woods, wood margins, meadows, mixed-grass steppes, and steppe scrub; in the South, insular woods, steppe depressions, and valley meadows; in the North, wood margins and clearings in mixed woods, penetrating into the forest-steppe zone by way of riverside meadows; very rarely ascending in mountain areas to the alpine meadow zone.— Arctic: Arc. Eur. (N. part of Pechora River basin), Arc. Sib. (lower reaches of the Yenisei); European part: Dv.-Pech. (N. part of the Pechora Basin), U. V. (Kasimov and Melenki districts, very rare), V.-Don (Central Russian Upland and Volga Hills), V.-Kama (the most westerly location – Verlugo District and throughout the Urals south of the Talitskii Zavod); Transv. (E.); W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenis., Lena-Kol., Ang.-Say., Dau.; Far East: Ze.-Bu., Uda, Sakh., Uss.; Centr. Asia: Ar.-Casp. (N.), Balkh. (N.), Dzu.-Tarb., T. Sh. (extreme E. – Ketmen Range). **Gen. distr.:** Mong., Manchuria, NE China. Described from Siberia. Type in London.

1. Ssp. angustifolium (Litw.) Bobr. – T. lupinaster f. angustifolia Litw. in Sch. ad HFR V (1905) 42. – ? T. romanicum Brandza in An. Ac. Rom. ser. II, XXV (1903) 153; Degen in Mag. Bot. Lap. III (1904) 62. – T. lupinaster f. albiflorum Vierh. in O. B. Z. XLVII (1918) 258, non Seringe. – Exs.: HFR No. 1321 a et b; Rchb. Fl. Germ. exs. No. 2559; Baenitz, Herb. Europ. 14 VII 1891. – Leaflets narrowly lanceolate, the ratio of breadth to length one eighth to one tenth, the plant as a whole more slender and lighter in color. (Plate XIII, Figure a). – European part: Balt. (Lithuania), U. Dnp. (Podolia, Korosten area, central Belorussia), M. Dnp. (Uman area), V.-Don (Lebedyan District, Snova River basin in the Zadonsk District). **Gen. distr.:** Centr. Eur. (Poznan, [former] W. and E. Prussia). Described from the Lebedyan District. Type in Leningrad.

1. var. albiflorum DC. Prodr. II (1825) 204; Ldb. Fl. Alt. III, 258. – Lupinaster albus Link, Handb. zur Frkenn. II (1831) 174. – T. lupinaster ciswolgense Sprygin in Uchen. Zapiski Kazansk. Gos. Univ., Vol. 96, pt. 6 (1936) 86. – Exs.: HFR No. 1322. – Flowers yellowish brown, somewhat smaller; leaflets slightly narrower than those of typical Siberian plants.

Distributed together with the typical red-flowered form (in some regions it actually predominates) in the SW part of the distribution area of the species.

202 3. **T. pacificum** Bobr. in Yubil. sbornik V. L. Komarovu (1939) 140. – T. lupinaster subvar. γ obtusifolium Belli in Mem. Ac. Torino, ser. 2, XLIV (1894) 263. – Ic.: Somoku-Dzusetsu, III, 14 (1912) tab. XVII; Bobrov l. c., Fig. 138.

Perennial, differing from the preceding species in its leaflets which are obovate-lanceolate or oblanceolate, broadest in upper third or quarter, the ratio of breadth to length being one quarter to one third; it is also earlier and, under comparable growing conditions, it flowers 2–3 weeks in advance of T. lupinaster. Fl. beginning of July; fr. August. (Plate XIII, Figure b).

Glades in forest margins and thickets in the Maritime Territory. – Far East: Uss. **Gen. distr.:** S. Japan. Described from Uss. at 44–45°N. lat. Type in London; cotype in Leningrad.

4. **T. eximium** Steph. ex DC. Prodr. II (1825) 203; Bunge, Suppl. z. Flora Alt. (1836) 84; Ldb. Fl. Ross. I, 551; Kryl., Fl. Zap. Sib. VII, 1605. – T. grandiflorum Ldb. in Spreng. Linnaei Syst. Veg. III (1826) 218; Ldb. Ic. pl. Fl. Ross. I (1829) 23, tab. 96, non Schreb.; Ej. Fl. Alt. III (1831) 257. – T. altaicum Vierh. in Oest. Bot. Zeitschr. LXVII (1918) 256. – Ic.: Ldb. l. c. (1829).

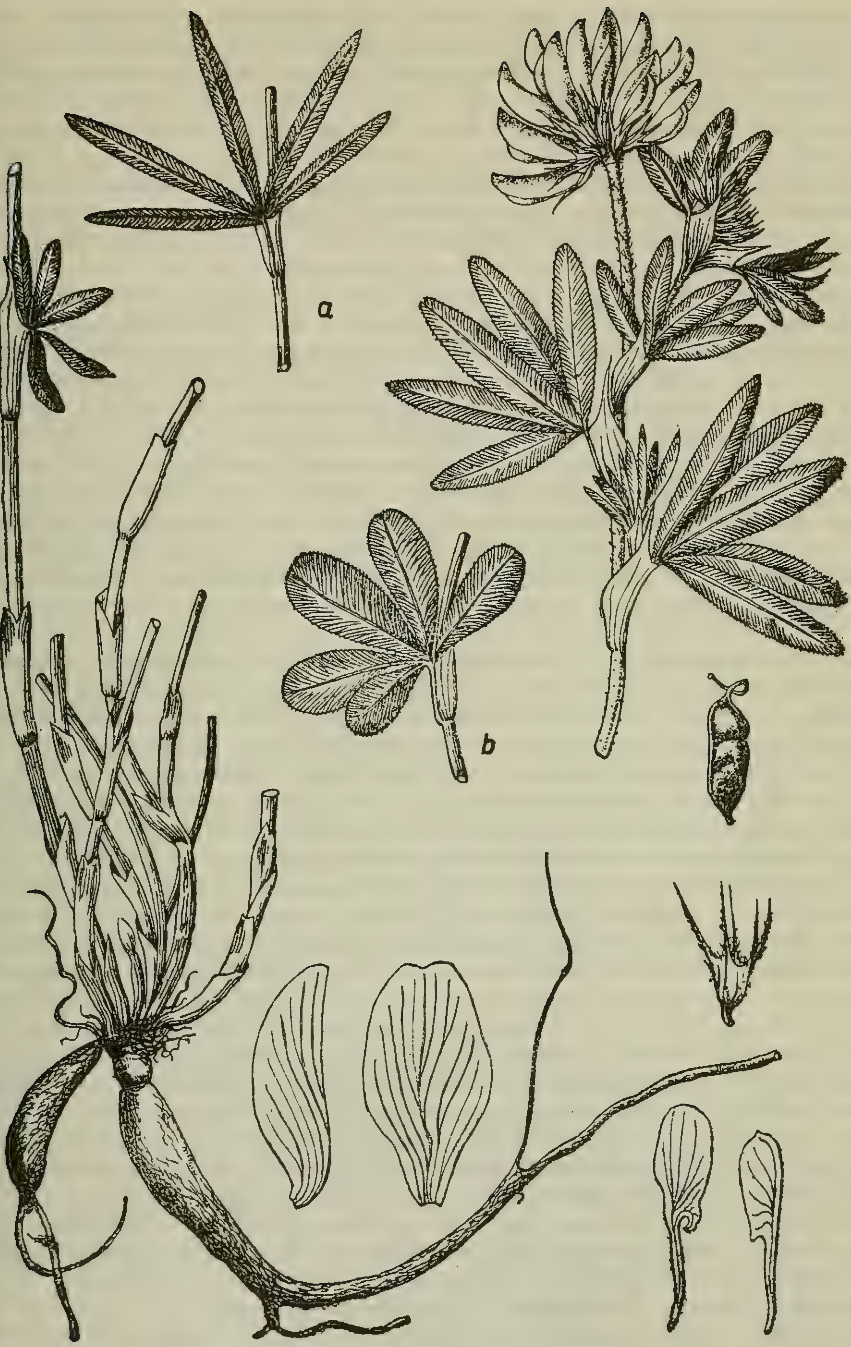

PLATE XIII. Trifolium lupinaster L. — habit and flower parts, pod; a — T. lupinaster ssp. angustifolium (Litw.) Bobr., leaf; b — T. pacificum Bobr., leaf.

Perennial; taproot straight, multicipital, short-branched in upper part; stems 3–12, weak, ascending or procumbent, 3–15 cm long, puberulent, the buried lower part covered with scalelike stipules, leafless or bearing rudimentary leaves, the upper part leafy; stipules oblong-ovate to sublanceolate, acuminate, united below, the lower membranous, the upper herbaceous with membranous base; leaves 3-foliolate, the pubescent petiole not longer than the leaf; leaflets 5–12 mm long, obovate, cuneate at base, dentate, glabrous above, pubescent beneath, especially on the midrib and on the distally prominent veins; peduncles axillary, 0.5–4 cm long, hairy, rarely subglabrous; flowers 1–5 in an umbel subtended by a narrow scarious crenate involucre; pedicels pubescent, 1–4 mm long; calyx 6–8 mm long, pubescent or glabrate; teeth half the length of calyx or slightly more, subequal; corolla reddish, 1.5–2 cm long; standard ovate, to 20 mm long and 14 mm broad, slightly emarginate, shortly attenuate below, slightly longer than keel and wings; ovary 5–8-ovuled; pod scarious, to 15 mm long, 3–5-seeded. Fl. June; fr. July. (Plate XIV, Figure 2).

Balds, glacial moraines, and gravel deposits in the alpine zone; descending over gravelly slopes, taluses and river valleys, to lower levels where it often occurs on pebbly or sandy valley accretions.— W. Siberia: Alt. (E. and 205 S.); E. Siberia: Ang.-Say. (S.), Dau. (Vitim River), Lena-Kol. (Kalar Valley); Centr. Asia: Dzu.-Tarb. (Saur, Mustau). **Gen. distr.**: Mong. Described from plants collected by Zalesov in Altai. Type in Leningrad.

5. **T. polyphyllum** C. A. M. Verz. Pfl. Cauc. (1831) 159; Ldb. Fl. Ross. I, 551; Boiss. Fl. Or. II, 148; Belli in Mem. Ac. Sc. Tor., ser. XLIV, 285; Grossg., Fl. Kavk. II, 269.— Ic.: Belli l. c. tab. II, f. 1.— Exs.: HFR No. 660.

Perennial, with profuse tufts of marcescent leaves surrounding the current year's shoots; taproot long, multicipital; flowering stems few, leafless (scapes), glabrous, 5–20 cm long; leaves basal, long-petioled; stipules almost scarious, united throughout with petiole, acuminate; petiole glabrous, twice to four times the length of leaf; leaflets (5) 7 (9), linear (var. stenophyllum Belli) to narrowly lanceolate, 1–2 cm long and 2–5 mm broad, glabrous, prominently veined beneath, the numerous lateral veins at an acute angle to midrib, the margin only in upper part sparsely denticulate; inflorescence terminal, umbellate, 3–8-flowered, sometimes 2-whorled or nearly so; involucre 1-leaved, to 1.5 mm broad, commonly crenate-incised into 5 or 6 segments; pedicels 2–3 mm long, glabrous, finally nodding; calyx glabrous, usually lilac or reddish, 10–13 mm long; teeth half the length of calyx, elongate-acuminate, often filiform at summit; flowers large, 1.5–2.5 cm long, pink to purple-violet or yellow to yellowish white (var. ochroleucum Somm. et Lev. ex Belli l. c.); standard ovate, slightly acuminate, broadest below the middle, strongly keeled at base; wings 1–2 mm shorter than standard and 1–2 mm longer than keel; ovary 2- or 3-ovuled, lance-linear, the style recurved at summit; filaments free to one-third; pod lanceolate, flat, scarious, ca. 1 cm long (excluding stipe and style), 3–5 mm broad, 1- or 2-seeded; seeds brown, ca. 2 mm in diameter. Fl. July; fr. August. (Plate XIV, Figure 1).

Meadows, balds, and moraines in the alpine zone.— Caucasus: Cisc. (W. part of the Main Range, in the high-mountain zone, as far east as Stolova near Ordzhonikidze), W. Transc. (Bzybskii, Ertsog, and Lanetsar ranges and the Nakhar Pass in Abkhazia). **Gen. distr.**: former Artvin District. Described from the alpine zone of the W. Caucasus. Type in Leningrad.

Note. A closely related species, T. alpinum L., is distributed through the alpine areas of W. Europe, from Asturia to Tyrol and the Apennines.

Economic importance. A good forage plant of the alpine zone, yielding a limited amount of herbage.

Section 3. **AMORIA** Presl, Symb. bot. I (1830) 43, pro gen.; Lojac. in Nuov. Giorn. bot. Ital. XV (1883) 228. — Pedicels finally recurved or nodding; calyx 10-nerved, rarely 5-nerved; pod sessile, 2—6-seeded.

6. **T. bordzilowskyi** Grossh. in Journ. Soc. Bot. Russ. 14 (1929) 311; Grossg., Fl. Kavk. II, 276. — T. humboldtianum Trautv. in A.H.P. II (1873) 519, non A. Br. et Aschers.; Bordzilovskii in Zap. Kievsk. obshch. estestv. XXV, 1 (1915) 83.

Perennial; taproot straight, multicipital, usually giving rise to short stolons terminating in erect stems, these 15—50 cm long, glabrous below, with scattered short soft hairs in upper part, sparingly branched; stipules scarious, ovate-lanceolate, acuminate, the upper narrower, the radical and lower cauline petiolate, the petiole glabrous or slightly hairy, one and a half times length of leaflets; petiolules short, hairy; leaflets coriaceous, oblong-lanceolate to elongate-elliptic, 4—10 (12) cm long and to 2 cm broad, glabrous sometimes puberulent beneath on the prominent and terminally thickened veins, the margin serrulate; heads 1—5, long-peduncled, many-flowered, rather compact, 2—3 cm long, finally ovoid; pedicels ca. 1 mm long; bracteoles large, about as long as calyx-tube, scarious, lanceolate, acuminate, keeled, 3—5-veined, the upper ones narrower; flowers 12—15 mm long; calyx 6—8 mm long, the tube pale, glabrate or short-hairy, the teeth less than half length of calyx, subulate-acuminate from lanceolate base, scarious-margined; corolla white, finally turning yellow; standard united only at base, lanceolate, 12—15 mm long and 3.5—4.5 mm broad, conduplicate, recurved about the middle; wings lanceolate, 8—10 mm long, their claws united in lower part; keel 7—9 mm long; ovary lanceolate, glabrous, 2-ovuled; pod 1-seeded? Fl. July.

Mountain steppes. — Caucasus: S. and E. Transc. **Gen. distr.:** Asia Minor (former Kars Region — Sarykamysh, Kars). Described from the Akhty area. Type in Leningrad.

7. **T. montanum** L. Sp. pl. ed. 1 (1753) 770, non p. 772; M. B. Fl. taur.-cauc. II, 218; Ldb. Fl. Ross. I, 552; Boiss. Fl. or. II, 146, p. p.; Shmal'g., Fl. I, 243; Kryl., Fl. Zap. Sib. VII, 1608. — T. subulatum Gilib. Fl. Lithuan. IV (1782) 90; id. ex Usteri, Delect. opusc. II (1793) 368. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 109; Hegi, III, Fl. IV, 3, 1310. — Exs.: HFR No. 610; Fl. Pol. exs. No. 160; Fl. Lituana exs. No. 10; Pl. Finl. exs. No. 1228. Vernacular name: belogolova [whitehead].

Perennial; taproot straight, woody, sometimes 2- or 3-headed, hence often giving rise to 2 or 3 leaf rosettes; stems solitary, axillary from rosette, erect or briefly ascending, 20—60 cm long, mostly simple, rigid, rather densely appressed-hairy to grayish-sericeous; stipules ovate, acuminate, coriaceous, prominently veined, hairy; leaves similarly gray with appressed hairs, the basal on petioles 10—20 cm long; the cauline 2—4, short-petioled; leaflets short-petioluled, elliptic to elliptic-lanceolate, stiff, grayish, 1.5–6 cm long and 1–2.5 cm broad, sometimes mucronulate, usually pubescent beneath, finally glabrescent, the prominent veins thickened toward the serrulate margin; heads mostly 2 on each stem, borne on long densely hairy peduncles, ellipsoid or ovoid, compact, many-flowered, 1.5–2.5 cm long; flowers 7–9 mm long; bracteoles scarious, lance-subulate, slightly exceeding pedicels, these ca. 1 mm long, finally recurved; calyx 3.5–4 mm long, the tube pale, short-hairy; teeth less than half length of calyx, acuminate from lanceolate base; corolla pale, becoming brownish yellow; standard ovate-lanceolate, 7–9 mm long, conduplicate, recurved about the middle, united at base; wings and keel lanceolate, their claws united, the wings 5–7 mm long, the keel scarcely shorter; ovary lanceolate, glabrous, 3-ovuled; pod commonly 2-seeded. Fl. June; fr. July.

Dry meadows, grassy slopes, wood margins, and mountain meadows. — European part: all regions, less frequent in the NE, in Kar.-Lap. in S. part (adventive in Khibiny), in Dv.-Pech. only in SW (adventive in Kadnikov, Konosha), in the Crimea only in the forest zone of the mountains; Caucasus: Cisc. (N. slope of the Main Caucasus Range up to the subalpine zone), E. Transc. (a single location — Mtskheta area, adventive?); W. Siberia: U. Tob., Irt. (extreme SW), Ob (SW, as far north as Tobol'sk and disjunct in the SE in the Tomsk area); Centr. Asia: Ar.-Casp. (extreme N.). **Gen. distr.**: S. Scand., Centr. and S. Eur., N. Balkan Peninsula. Described from N. Europe. Type in London.

Economic importance. Insignificant; on account of the coarse and hairy herbage this plant is hardly ever eaten. Only very young plants are eaten readily enough by small livestock.

8. **T. ambiguum** M. B. Fl. taur.-cauc. II (1808) 208, III (1819) 507; Ldb. Fl. Ross. I, 552; Boiss. Fl. or. II, 147; Shmal'g., Fl. I, 243; Grossg., Fl. Kavk. II, 277. — T. vaillantii M. B. in Fisch. Catal. Horti Gorenk. (1808) 111. — T. humboldtianum A. Br. et Aschers. in Ind. Sem. horti Berol. (1868) 24; Boiss. Fl. or. II, 147; Grossg., Fl. Kavk. II, 277.

208 Perennial, 8–60 cm high; taproot straight, woody, multicipital; stems often short, rarely branched, ribbed, glabrous or slightly pubescent in upper part; leaves mostly radical; stipules lanceolate, broadly scarious-margined; petioles glabrous, the lower 3–20 cm long, the upper shorter; leaflets on short crisp-hairy petiolules, lanceolate, glabrous, with an arrow-shaped spot, 1–5 (7) cm long and 0.8–3.5 cm broad, broadest somewhat below the middle, the numerous and very prominent veins thickened toward the serrate-denticulate margin; heads terminal, solitary, rarely 2 or 3, at first globose, finally oblong-ovoid, 2.5–4 cm long and 2–3 cm broad, many-flowered but relatively loose; peduncles long, ribbed, glabrous or slightly hairy; bracteoles linear-subulate, scarious, three to six times as long as pedicels, these 1–2 mm long, recurved in fruit, glabrous or sparsely hairy; flowers 12–16 mm long; calyx ca. 5 mm long, the pale tube distinctly nerved, glabrous or in upper part sparsely covered with soft crisp hairs; teeth less than half length of calyx, subulate from broadly lanceolate base, with white scarious margin; corolla white, finally reddish; standard oblong, 12–15 mm long and 5–7 mm broad, narrowly lanceolate; keel 5–6 mm long, lanceolate, broader; ovary sessile, lanceolate, glabrous, 2-ovuled; pod containing 1 or 2 seeds. Fl. June–July. fr. July–August.

9)

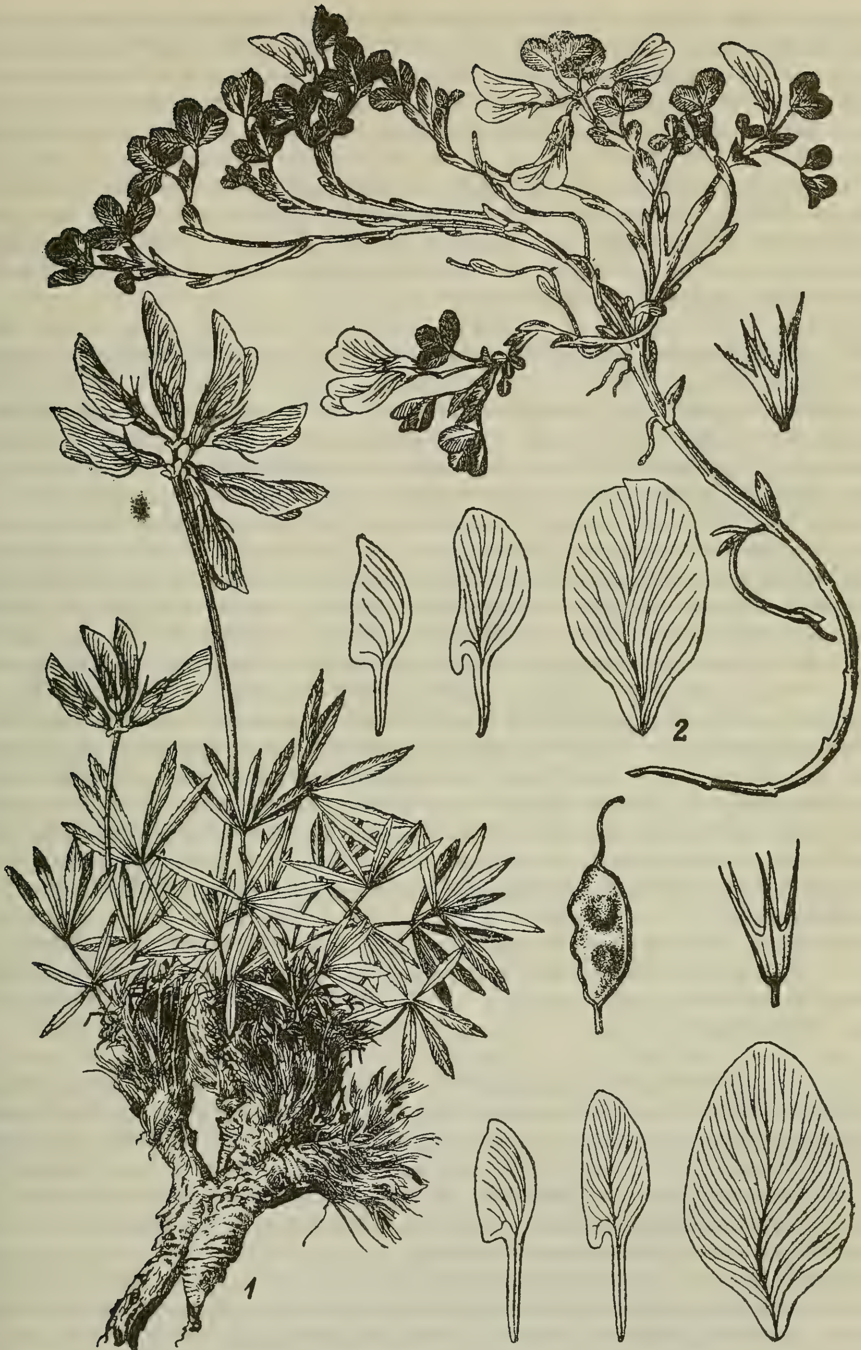

PLATE XIV. 1 — Trifolium polyphyllum C.A.M., aspect, flower parts, pod; 2 — T. eximium Steph., aspect, flower parts.

Steppe depressions, forest margins and glades, mountain meadows up to the subalpine and even the alpine zone; in S. Transc. – to 3,000 mm above sea level. – European part: Bes., M. Dnp. (SW), Bl., L. Don (SW), Crim.; Caucasus: all regions except Tal. **Gen. distr.**: Asia Minor (Turkish Armenia – Kars, Melyazgert, Artvin, Ardahan). Described from the Crimea. Type in Leningrad.

Note. The report concerning the occurrence of this species in the [former] Semigrad Principality is probably erroneous.

Economic importance. A very valuable forage plant, worthy of introduction into cultivation for cutting in perennial pastures; it also holds promise for the southern parts of the forest zone.

9. **T. elizabethae** Grossh. in Journ. Soc. Bot. Russ. 14 (1929) 309; Grossg., Fl. Kavk. II, 276.

Perennial, glabrous, loosely cespitose, 7–30 cm high; taproot straight,
211 woody, sometimes multicipital; stem obsolescent or but 2–4 cm long; leaves radical, with petioles 5–15 cm long and scarious lanceolate stipules; petiolules short, sometimes slightly pubescent; leaflets broad-elliptic, 1–3 cm long and 0.8–2.5 cm broad, glabrous, the rather distinct veins somewhat thickened toward the denticulate margin; heads solitary, loose, subglobose at anthesis, to 3 cm in diameter; peduncles 5–25 cm long, glabrous exceeding leaves; bracteoles scarious, scarcely noticeable; pedicels several times length of bracteoles, 1–2 mm long, finally nodding; flowers 12–17 mm long; calyx ca. 5 mm long, campanulate, glabrous; tube pale, the nerves not very conspicuous; teeth half or slightly more than half length of calyx, subulate-acuminate, green, with a pale scarious margin in lower part, the upper ones somewhat longer; corolla white, drying pale yellow; standard free, lanceolate, 11–16 mm long, retuse, passing in lower quarter into a distinctly keeled claw; wings lanceolate, slightly recurved, 8–12 mm long, united only at the very base, slightly auriculate; keel 7–9 mm long, the limb subelliptic; ovary sessile, lanceolate, commonly 3-ovuled; pod lanceolate, 2-seeded, the persistent corolla brownish yellow. Fl. June–July; fr. July–August.

Subalpine and alpine meadows, at altitudes between 1,500 to 2,500 m above sea level. – Caucasus: Cisc. (high-mountain part of the Main Caucasus Range in Balkariya and Digoriya). Endemic. Described from Balkariya. Type in Leningrad.

10. **T. repens** L. Sp. pl. (1753) 767; M. B. Fl. taur.-cauc. II, 208; Ldb. Fl. Ross. I, 553; Turcz. Fl. baic.-dahur. I, 281; Boiss. Fl. or. II, 145; Shmal'g., Fl. I, 244; Grossg., Fl. Kavk. II, 274; Kryl., Fl. Zap. Sib. VII, 1608; Fl. Tadzh. V, 204; Hegi, Ill. Fl. IV, 3, 1302. – T. nothum Stev. in Bull. Soc. Nat. Mosc. XXIX, 3 (1853) 137. – Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 115; Hegi, l. c. – Exs.: HFR No. 258; Fl. Pol. exs. No. 720; Fl. Lithuana No. 9; Pl. Finl. exs. No. 1229. Vernacular name: klever belyi [white].

Perennial; root multicipital; main stem 1–4 cm long; axillary shoots glabrous, prostrate, 10–30 cm long, branched, rooting at lower nodes, often hollow, ascending at tips; stipules large, scarious, lanceolate, acuminate, pale, lilac-veined; petioles to 30 cm long, ascending; leaflets short-petioluled, obovate, emarginate, 1–2 (3) cm long and slightly less broad, the numerous inconspicuous lateral veins forking, the margin denticulate; heads globose, ca. 2 cm broad, loose, 30–80-flowered; peduncles usually longer and stouter than petioles, sometimes pubescent at summit; bracteoles scarious, lanceolate, much shorter than pedicel; pedicels about equaling calyx, those of upper flowers sometimes up to twice as long, sometimes slightly pubescent; flowers 6–12 mm long; calyx campanulate, ca. 3 mm long, pale, with 10 green nerves, the tube sometimes lilac-spotted in upper part between the teeth, these less than half length of calyx, lance-acuminate; corolla white, sometimes pale yellow, pink, or greenish, finally brown; standard 6–12 mm long, elliptic, free; wings slightly more than half length of standard, their claws united with keel and staminal tube; ovary 5- or 6-ovuled; pod linear, containing 3 or 4 seeds. May–October.

Dry meadows and mud flats, rarely saline meadows; wood margins and open woods, banks of rivers and brooks (adventive in the Arctic region); plains and places naturally and artificially supplied with water in the steppe and semidesert zones; southern mountains up to subalpine meadows; often a weed at roadsides, near dwellings, and in barrens. – Arctic: Arc. Eur. (Murman Coast, Kanin); European part: all regions (rare in Dv.-Pech.); Caucasus: all regions (in mountains up to 2,500 m); W. Siberia: all regions (in S. Ob region, adventive in Salekhard; in Altai up to 600 m); E. Siberia: Yenis. (S., in the Yenisei Valley as far as 68° N. lat.), Lena-Kol. (SW, as far north as the Yakutsk district), Ang.-Say., Dau.; Far East: all regions except Okh. and An., whence not reported; Centr. Asia: all regions except E. Pamir and plain deserts where confined to oases. **Gen. distr.**: Scand., all Europe, W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., Mong., Jap.-Ch., introduced in all parts of the world. Described from N. Europe. Type in London.

Economic importance. An excellent forage plant, used mostly for pasturage. Cultivation of this species in the USSR is widespread in the W. regions (Belorussia, Ukraine, and to some extent in the Baltic States). A gigantic form of white clover, the so-called ladino clover, is grown on a small scale in W. Ukraine; as opposed to the common form, this clover is adapted for cutting.

Note. The natural distribution of this species is apparently confined to the E. regions of W. Siberia, where it stretches up to the 60th parallel; in an easterly direction, as far as Kamchatka, it has followed in the wake of agricultural development and is widespread only in inhabited areas.

11. **T. hybridum** L. Sp. pl. (1753) 766; M. B. Fl. taur.-cauc. II, 208; Ldb. Fl. Ross. I, 554; Boiss. Fl. or. II, 145; Shmal'g., Fl. I, 244; Kryl., Fl. Zap. Sib. VII, 1609. – T. fistulosum Gilib. Fl. Lithuan. IV (1781) 86; Ej. in Usteri delect. opusc. (1793) 367; Rouy et Fouc. Fl. Fr. V, 82; Grossg., Fl. Kavk. II, 275. – T. hybridum α fistulosum Syreishch., Fl. Mosk. gub. IV (1914) 114. – T. elegans Savi Fl. Pis. II (1798) 161; Ej. Observ. Trif. Sp. (1810) 92; Ldb. l. c. 555; Grossg., l. c. – T. hybridum β elegans Boiss. l. c.; Shmal'g., l. c.; Syreishch., l. c. – T. anatolicum Boiss. Diagn. pl. nov. ser. 1, 2 (1843) 34. – T. hybridum γ anatolicum Boiss. Fl. or. II (1872) 146. – T. michelianum Bess. in Flora II (1832) Beibl. 32, non Savi; Ldb. l. c. 555, non Savi. – Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 117; Shtebler and Shreter, Korm. travy, Plate XIII. – Exs.: HFR No. 1660; Fl. pol. exs. No. 921. – Russian names: klever shvedskii [Swedish], rozovyi [pink].

Perennial or biennial; stems few, 30–60 cm long, ascending, glabrous or in upper part slightly pubescent, simple or few-branched, often hollow;

stipules pale, coriaceous, ovate or ovate-lanceolate, elongate-acuminate, united for about one-quarter their length with petiole, the 3–5 veins forking toward margin; petioles of basal leaves to 20 cm long, those of cauline leaves shorter and decreasing up the stem, glabrous, rarely with scattered short hairs toward summit; petiolules equal, usually glabrous, in plants of dry habitats more or less hairy; leaflets oval to broad-elliptic, 1.5–3 cm long, not spotted, with 20–40 dentations on each margin, glabrous, sometimes hairy at base of midrib beneath; heads 2 or 3 at end of stem, axillary, globose, 1.5–2 cm broad, 20–30-flowered; peduncles glabrous or sometimes pubescent at summit, 5–7 cm long, about twice the length of adjacent leaves; pedicels hairy, usually longer than calyx-tube, nodding in fruit; flowers 5–8 mm long; calyx pale, 5-nerved, the lower teeth shorter and more distant; corolla dingy white, turning pale pink and finally pink, brownish in fruit, twice as long as calyx; standard ovate, free, conduplicate, much longer than wings and keel; pod exserted from calyx, ellipsoid, glabrous, 2–4-seeded. May–September.

Wet or rarely dry meadows, scrub, often in fields of red clover, and cultivated. — European part: all regions, Kar.-Lap. to Kirovsk, Dv.-Pech. (S.), and northward to Arkhangel'sk; Caucasus: all regions except Dag. (where not yet reported) and E. part of E. Transc.; W. Siberia: introduced: Ob (Tyumen; Ob Valley below 62°, Novosibirsk), Irt. (Omsk, Semipalatinsk), Alt. (Kuznetsk, introduced into extreme SW); E. Siberia: Dau. (introduced into Nercha Valley); Far East: introduced in Ze.-Bu. (vicinity of Blagoveshchensk), Uss. (Khabarovsk, Spassk, Voroshilov [Ussuriisk], Vladivostok), Sakh. (village of Arkovo); Centr. Asia: introduced in T. Sh. (Alma-Ata). **Gen. distr.**: all Europe, Med., Bal.-As. Min. Cultivated in many European countries, in the U. S. A., and particularly in Canada. Described from Europe. Type in London

Economic importance. Cultivated in herbage mixtures for cutting, and, compared with red clover, it presents certain advantages, since it stands up to excessive moisture content of soil, does not produce clover-sickness, 214 does not blacken in drying for hay, gives consistent seed yields, and its quality compares favorably with that of red clover.

12. **T. angulatum** W. et K. Descr. pl. Hung. I (1802) 26; Shmal'g., Fl. I, 234; Grossg., Fl. Kavk. II, 274. — Ic.: W. et K. l. c. tab. 27; Rchb. Ic. Fl. Germ. XXII, tab. 2162. — Exs.: Fl. Hung. Exs. No. 679.

Annual, branched from base; stems 10–40 cm long, glabrous, ascending, slightly bent at nodes; stipules elongate-acuminate from ovate base, obscurely few-veined; petioles as long as leaflets or, especially the lower, twice to three times as long; petiolules short, equal; leaflets cuneate-obovate to oblanceolate, 0.8–1.8 cm long, with 8–13 pairs of veins, the margin attenuate-toothed almost from base; peduncles usually somewhat longer than subtending leaves, finally nodding; heads axillary, globose, to 1.5 cm long, loose, in fruiting subglobose; pedicels to 3 mm long, as long as or slightly longer than calyx-tube, nodding in fruit; calyx narrowly campanulate, ca. 5 mm long; teeth at least half length of calyx, subulate, the lower scarcely shorter than the upper, the subsidiary nerves inconspicuous; corolla reddish, to 8 mm long; standard lanceolate, the prominent lateral nerves at an acute angle to midnerve; wings and keel long-clawed; ovary lanceolate, subsessile, commonly 4-ovuled; pod containing 3 or 4 seeds, distinctly contracted between seeds, the persistent style one-third as long as the pod. Fl. May; fr. June.

Solonetz meadows. — Caucasus: Cisc. (Voroshilovsk [Stavropol'], Maikop, Temryuk, Groznyi, Pyatigorsk, Mineral'nye Vody), E. Transc. (Tbilisi, according to Grossheim). **Gen. distr.**: Centr. Eur. (Hungary), Bal.-As. Min. (Serbia, reported for Macedonia). Described from Hungary.

Economic importance. May be of interest for undersowing in solonetz meadows.

Section 4. **MICRANTHEMUM** Presl, Symb. bot. (1830) 47 pro gen.; Čelak. in Oest. Bot. Zeitschr. XXIV, 41, p. p.; Gib. et Belli in Mem. Acad. Sc. Torino, ser. II, XLI, 51; Herm. in Fedde Repert. XXXIX, 333, 339. — Flowers bracteolate; calyx 10-nerved, with open throat and teeth reflexed in fruit; standard free or scarcely united with staminal tube; annual plants; leaflets with veins thickened toward margin beneath.

13. **T. parviflorum** Ehrh. Beitr. VII (1792) 165; Ldb. Fl. Ross. I, 553; Boiss. Fl. or. II, 143; Shmal'g., Fl. I, 243; Gib. et Belli in Mém. Acad. Sc. Torino, ser. II, XLI, 59; Grossg., Fl. Kavk. II, 275. — T. strictum L. Sp. pl. (1753) 770, p. p. — Ic.: Rchb. Ic. Fl. germ. XXII, tab. 2162 f. II. — Exs.: Fl. Hung. exs. No. 682.

Annual, profusely branched from base; stems 5—25 cm long, glabrous, almost procumbent to ascending; stipules coriaceous, broad-ovate, abruptly subulate-pointed, the lower 2- or 3-veined, the upper 3—6-veined; petioles twice to three times as long as leaflets; petiolules short, equal; leaflets cuneate to lanceolate, 0.5—1.5 cm long, 2—3 times as long as broad, the margin unequally dentate almost from base; veins 9—15 on each side, more prominent beneath, usually forking toward margin; peduncles stout, 1—2.5 cm long, mostly not exceeding the subtending leaf; heads globose, 1—1.5 cm long, axillary; pedicels much shorter than calyx, not recurved in fruit; calyx 4—6 mm long, 10-nerved, unevenly pubescent; teeth half length of calyx, spreading in fruit, the lower shorter; corolla pink or white, about as long as calyx; standard free, ovate; pod sessile, ovoid, commonly 2-seeded. Fl. May; fr. June.

Feathergrass-fescue steppes in plains and foothills, often pastures, roadsides, coastal sands, and dry grassy slopes in mountains. — European part: Bes., Bl., L. Don (S.), Crim.; Caucasus: Cisc., Dag., E. and S. Transc., Tal. (Lenkoran). **Gen. distr.**: W. and E. Med., Centr. Eur. (Hungary), Bal.-As. Min. Described from Hungary.

14. **T. glomeratum** L. Sp. pl. (1753) 770; Ldb. Fl. Ross. I, 553; Boiss. Fl. or. II, 142; Gib. et Belli in Mem. Acad. Sc. Torino, ser. II, XLI, 53; Grossg., Fl. Kavk. II, 276. — Ic.: Engl. Bot. No. 1063; Schlecht., Lang. u. Schenk, Deutschl. Flora XXIII, tab. 2394; Gib. et Belli l. c. tab. III, 1. — Exs.: Fl. Ital. exs. No. 1862.

Perennial; stems 3—10, spreading or ascending, sometimes erect, sparsely branched, angled, glabrous or in upper part with scattered hairs, 8—20 (30) cm long; stipules scarious, lanceolate, long-acuminate, much shorter than petiole, the uppermost shorter, subovate, subtending the head; petioles usually hairy, the lower long, the upper not longer than leaflets;

petiolules short, hairy; leaflets obovate to cuneate, sometimes oblanceolate, 0.6–1.5 cm long and 0.5–1 cm broad, glabrous, with prominent midrib beneath, the lateral veins terminating in the dentations of the margin; heads sessile, axillary globose, ca. 1 cm long, shorter than adjoining leaves, compact, with crowded sessile flowers; bracteoles lanceolate, pale, shorter than calyx; flowers 6–8 mm long; calyx 4–5 mm long, broad, glabrous, prominently 10-nerved; teeth scarcely more than one-third length of calyx, thin, triangular, acuminate, darker than tube, with prominent midnerve and 216 2 less distinct lateral nerves, reflexed in fruit; corolla pink, twice as long as calyx-tube; standard free or scarcely united with staminal tube, obovate-lanceolate, sometimes subtruncate; wings broader and slightly longer than keel; pod scarious, containing 1 or 2 seeds. Fl. April; fr. May.

Seaside meadows. — Caucasus: W. Transc. (Sukhumi, Batumi, Rion station Tal. **Gen. distr.**: Atl. Eur., W. and E. Med., Bal.-As. Min. Described from England. Type in London.

15. **T. suffocatum** L. Mant. (1771) 276; Ldb. Fl. Ross. I, 533; Boiss. Fl. or. II, 142; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLI, 56; Grossg., Fl. Kavk. II, 275. — Ic.: Engl. Bot. No. 1049; Schl., Lang. u. Schenk, Fl. XXIII No. 2391; Gib. et Belli l. c. tab. III, 2. — Exs.: Fl. Ital. exs. No. 1078.

Perennial, tufted; stems numerous, procumbent, 2–10 cm long, glabrous, sparsely branched; stipules scarious, ovate, glabrous, thin, long-acuminate; petioles long, erect, overtopping stem, sometimes with scattered hairs at summit; petiolules short, hairy; leaflets obcordate or obovate-cuneate, truncate, glabrous, dentate; heads 3–8 along each stem, globose, 5–8 mm long, sessile, axillary, often approximate, greatly overtopped by adjoining leaves; flowers 3–5 mm long, sessile; bracteoles lanceolate, much shorter than calyx; calyx 3–5 mm long, glabrous, cartilaginous; teeth less than half length of calyx, broadly triangular, acuminate, reflexed in fruit; corolla shorter than calyx-teeth, pale pink; standard obovate, slightly exceeding wings, the short claw slightly united with staminal tube; wings slightly shorter and narrower than keel; ovary ellipsoid, short-stipitate, 2-ovuled; fruit large, obovoid, exserted from calyx-tube, scarious, containing 2 seeds. Fl. April; fr. May.

Coastal sands. — Caucasus: Tal. (Lenkoran). **Gen. distr.**: W. and E. Med., Bal.-As. Min. Described from Sicily. Type in London.

Section 5. **MISTYLUS** Presl, Symb. Bot. (1830) 49, pro gen.; Čelak. in Oest. Bot. Zeitschr. XXIV (1874) 41. — Vesicastrum Koch, Synopsis I (1837) 167; Ldb. Fl. Ross. I, 550; Boiss. Fl. Or. II, 138; Herm. in Fedde Repert. XXXIX (1936) 333, 336. — Vesicaria L. Sp. pl. (1753) 771, p. p. — Triganthemum Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLII (1891) 3. — Calyx not bilabiate, with naked throat, regularly inflated in fruit; standard free, without a distinct claw, marked by numerous longitudinal nerves; bracteoles ovate or lanceolate, scarious, many-nerved, slightly shorter than calyx-tube; annual plants with leathery-marcescent flowers.

217 16. **T. spumosum** L. Sp. pl. (1753) 771; Ldb. Fl. Ross. I, 551; Boiss. Fl. or. II, 138; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLII, 9; Grossg., Fl. Kavk. II, 272. — Ic.: Gib. et Belli, l. c. tab. I, 1. — Exs.: Schultz, Herb. norm. No. 1961.

Annual; stems few, 15–40 cm long, spreading, glabrous, branched; stipules scarious, ovate, long-attenuate, basal petioles long, the cauline shorter, subopposite; petiolules sometimes sparingly hairy; leaflets obovate to broad-cuneate, rarely subrhombic, glabrous, inconspicuously veined, dentate; peduncles longer than adjoining leaves; heads globose, loose, ca. 2 cm broad, enlarging in fruit; flowers 15–18 mm long; bracteoles scarious, ovate, elongate-acuminate, with numerous longitudinal nerves, slightly shorter than calyx-tube; calyx 10–13 mm long, the tube broadly fusiform, glabrous, 20–25-nerved, in fruit strongly inflated and broadly conical, reticulate with distinct lateral nerves; teeth from one-quarter to not more than one-third length of calyx, with deeper incision between the dorsal pair, reflexed in fruit; corolla purple, 3–5 mm longer than calyx, coriaceous-marcescent; standard free, lanceolate, acuminate, many-nerved; wings and keel with very long claw and lanceolate acuminate limb; ovary lanceolate, commonly 4-ovuled; pod scarious, containing 3 or 4 seeds. Fl. May; fr. June.

Grassy meadows in the submontane zone and thickets. – Caucasus: Dag. (S. coastal part), E. Transc. (E., Mugan and Shirvan steppes), Tal. **Gen. distr.**: W. and E. Med. (to Palestine), Bal.-As. Min., Arm.-Kurd., Iran. (Astrabad [Gurgan]). Described from S. France. Type in London.

17. **T. vesiculosum** Savi Fl. Pis. II (1798) 165; Ldb. Fl. Ross. I, 550; Boiss. Fl. or. II, 139; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLII, 13; Shmal'g., Fl. I, 242; Grossg., Fl. Kavk. II, 272. T. recurvum W. et K. Pl. rar. Hung. II (1805) 149, tab. 165. – T. turgidum M. B. Fl. taur.-cauc. II (1808) 216, III, 54. – Ic.: Bot. Regist. XVII, tab. 1408; W. et K. l. c.; Gib. et Belli l. c. tab. 1, 2; Rchb. Ic. Fl. Germ. XXII tab. 104. – Exs.: Schultz, Herb. norm. No. 242.

Annual; stem 15–40 cm long, glabrous, angled, often reddish, simple or few-branched; stipules linear-lanceolate, scarious, prominently nerved, the free portion long-acuminate; basal petioles long, the upper shorter, subopposite; leaflets petioluled, glabrous, lanceolate, 1.5–4 cm long and 0.5–1.5 cm broad, prominently veined beneath, acutely, serrate-dentate, usually apiculate, with a pale arrow-shaped spot above; peduncles surpassing terminal leaves; heads spuriously terminal at ends of branches, solitary, at first broadly conical, finally oblong to ovoid-cylindric, 3–5 cm long and 2.5–3.5 cm broad; flowers numerous, 15–18 mm long; bracteoles scarious, lanceolate, acuminate, exceeding calyx-tube; calyx 8–10 mm long, glabrous, at first fusiform, in fruit regularly inflated, subpyriform, distinctly 20–30-nerved, more or less regularly reticulate by transverse nerves; teeth not more than half length of calyx, broadly triangular at base, usually 5-nerved, narrow, subulate-acuminate, erect or in fruit reflexed; corolla pale pink or almost purple, coriaceous-marcescent, about twice length of calyx; standard free, obsoletely clawed, oblong-lanceolate, attenuate at summit, striate by numerous longitudinal nerves; wings and keel slightly shorter, also striate, narrow, acuminate; ovary sessile, 2- or 3-ovuled, with a long style; pod scarious, containing 2 or 3 seeds. Fl. and fr. June–July.

Dry grassy slopes. – European part: Bes., Bl. (S.), Crim. (according to Schmalhausen); Caucasus: Cisc. (only W. part). **Gen. distr.**: W. and E. Med. (S. Europe), Balkan Peninsula (from Banat to Greece). Described from Pisa. Type in Italy.

Section 6. **CHRONOSEMIUM** Ser. in DC. Prodr. II (1825) 204; Celak. in O. B. Z. XXIV (1874) 40; Gibelli et Belli in Malpighia III (1889) 193; Ldb. Fl. Ross. I, 555. — Amarenus Presl, Symb. bot. I (1830) 47, pro gen. — Lotophyllum Rchb. Ic. exot. I (1827) 7. — Calyx 5-nerved, with open throat almost bilabiate; petals yellow, rarely lilac or reddish, finally brown, free, very rarely scarcely united, dry-coriaceous in fruit, retaining their shape; pod stipitate, 1-seeded; bracteoles obsolescent, often reduced to a few cells.

18. **T. stipitatum** Boiss. et Bal. in Boiss. Fl. Or. II (1872) 149; Grossg., Fl. Kavk. II, 270.

Biennial or annual; stems 5–25 cm long, erect or ascending, profusely branched from base, glabrate or sparingly hairy, more profusely at summit; stipules lanceolate, prominently 3–5-nerved, ciliate on the margin and at apex; basal petioles to 4 cm long, the upper approximate to almost opposite, shorter than leaflets; petiolules equal; leaflets obovate to cuneate, with 5–8 pairs of veins, dentate in upper two-thirds, retuse at apex; heads few, 219 terminal and axillary, 4–11-flowered (fewer flowers in axillary inflorescences); peduncles hairy, twice or three times as long as leaves; pedicels short, nodding, one-third to half length of calyx-tube; calyx glabrous, bilabiate, the upper teeth slightly shorter than tube, the lower twice to three times as long; corolla 8–10 mm long, reddish or lilac, finally yellowish brown; standard oblong-ovate, conduplicate, inconspicuously few-nerved, longer than wings and keel; pod 1-seeded, obovoid, to 2 mm long, the stipe more than three times as long as the pod, the style twice as long. Fl. July; fr. August.

Wet subalpine meadows. — Caucasus: possibly growing in W. Transc. **Gen. distr.**: Asia Minor (former Artvin District near Arsianskii post; Kramskaya Yaila; Dzhimil Valley). Described from plants collected by Balansa in Dzhimil. Cotype in Leningrad.

19. **T. rytidosemium** Boiss. et Hohen. Diagn. pl. nov. sér. I, 9 (1849) 29; Boiss. Fl. or. II, 149; Albov, Prodr. Fl. Colch. 58; Grossg., Fl. Kavk. II, 270. — T. badium Ldb. Fl. Ross. (1842) 556, non Schreb.; Albov, l. c. — T. ponticum Albov in Trav. Sect. Odesse Soc. Hortic. (1891) 7; Grossg., Fl. Kavk. II, 269.

Perennial, biennial, or triennial plants, bushy-branched from base, with few flowering stems and reduced leafy basal shoots, hence apparently rosette-forming; stems weak, ascending or rarely erect, sparsely leafy, 15–30 cm long, sometimes dwarf (f. nanum Alb.), appressed-hairy; stipule oblong, lance-acuminate, adnate to petiole, the free portion not more than one-third the length, 5–8-veined, sometimes ciliate at margin and particularly at apex; petioles appressed-hairy, the lower to 5 (8) cm long, the upper shorter than stipules; petioles appressed-hairy, as are also principal veins of leaflets below; petiolules equal or subequal; leaflets oval 1–2 cm long and 0.7–1.5 cm broad, obtusish or retuse, with 15–20 pairs of veins, these prominent beneath, the midrib appressed-pubescent, the margin denticulate in upper two-thirds; heads terminal, 1 or 2 on the stem, 1.5–2 c long and as broad, relatively compact, many-flowered, prior to anthesis bristly with the long calyx-teeth, finally drooping; peduncles 2–3 cm long, finally elongating to 5–7–10 cm, appressed-hairy; pedicels very much shorter than calyx-tube; calyx-teeth ciliate, the lower three to four times as long as the upper, these slightly longer than tube; corolla at anthesis reddish yellow or lilac-yellow, turning brownish yellow and finally yellowish brown; standard to 8 mm long, elongate-cochlear, truncate and slightly retuse, prominently nerved and later subrugose; wings to 5 mm long, erect or somewhat spreading; keel less than half as long as standard; pod 1-seeded (?), the stipe very short, the style one-quarter to one-third as long as the pod. Fl. June, July; fr. July—August.

Wet meadows and slopes, moraines, calcareous rocks in the high-mountain zone.— Caucasus: Cisc. (the alpine zone in the W. and Centr. parts of the Main Range), W. Transc. (Main Range). **Gen. distr.**: Asia Minor (Cappadocia, Argeya [?]), Arm.-Kurd. (Turkish Armenia, Pontic Region), N. Iran (W. Elburz). Described from near Teheran in the Tochal Range. Cotype in Leningrad.

Note. Extremely similar to T. badium Schreb of European mountains; it differs from that species in the reddish or lilac coloring of its young flowers.

Economic importance. By analogy with the European T. badium, it may be recommended for undersowing in the high-mountain zone, on moraines and on alluvial deposits of mountain streams, because of its very high food value.

20. **T. spadiceum** L. Fl. Suec. ed. 2 (1755) 261; Ej. Sp. pl. ed. 2 (1762) 1087; Ldb. Fl. Ross. I, 555; Boiss. Fl. or. II, 150; Shmal'g., Fl. 1, 245; Grossg., Fl. Kavk. 271; Kryl., Fl. Zap. Sib. VII, 1610. — T. montanum L. Sp. pl. (1753) 772, non p. 770. — Ic.: Hegi, Ill. Fl. IV, 3, 1295. — Exs.: HFR No. 165; Herb. Fl. R. Sov. Ucr. No. 72; Fl. exs. Reip. Boh.-Slov. No. 234.

Biennial or annual; stems simple or branched from base, rarely branched in upper part where mostly appressed-hairy, (10) 15—35 cm long; stipules oblong-lanceolate, acuminate, often in lower part purple-spotted as are the stems, prominently nerved; leaves 3-foliolate; petioles hairy, often purple-spotted, the lower to 4 cm long, the upper shorter, the uppermost shortest, approximate to subopposite; leaflets subsessile, obovate to oblong-lanceolate, 1—2 cm long, rounded at apex or truncate, sometimes almost retuse, with 12—20 pairs of prominent veins the midrb hairy beneath, the margin denticulate in upper two-thirds; heads 1 or 2 at ends of stems, very rarely additional 1 or 2 from axils of upper leaves, ovoid, later elongating to 2 cm, compactly many-flowered, 10—12 mm broad; peduncles to 3 cm long, appressed-hairy; pedicels very short; calyx 2—3 mm long, the patulous-ciliate lower teeth three to four times as long as the upper; corolla to 6 mm long, golden-yellow, soon turning brownish and finally shining dark castaneous; standard ovate, vaulted, sulcate; wings somewhat spreading; pod 1-seeded, three to four times as long as the style. June—August.

Wet, often boggy meadows, forest glades, open woods in gullies, mountain meadows, valleys of mountain streams, and moraines; avoiding soils with a high lime content. — European part: Kar.-Lap. (as far N. as the Solovetskie Islands), Lad.-Ilm., Dv.-Pech. (except NE), Balt., U. Dnp., U. V., V.-Kama, U. Dns., M. Dnp. (N.), V.-Don, Transv. (extreme N.), L. Don (N.); Caucasus: Cisc. (slopes of the Main Range), Dag. (mountains), W. and S. Transc., E. Transc. (W.); W. Siberia: U. Tob. (extreme NW), Ob (extreme SW), eastward to Tobol'sk. **Gen. distr.**: Atl. and Centr. Eur., Med. (N.), Bal.-As. Min. Described from Europe. Type in London.

21. **T. speciosum** Willd. Sp. pl. III (1800) 1382; Boiss. Fl. or. II, 151; Shmal'g., Fl. I, 245; Grossg., Fl. Kavk. II, 269. – T. gussonei Tineo, Pl. rar. Sic. pug. I (1817) 17; Ldb. Fl. Ross. I, 557. – Ic.: Sibth. Ic. Fl. Gr. VIII (1833) tab. 754. – Exs.: Fl. Ital. exs. No. 1685; Orphan. Fl. graeca exs. No. 604

Annual; stems 10–25 cm long, erect or ascending, sometimes somewhat spreading, branched, commonly appressed-hairy; stipules broadly lanceolate acuminate, prominently veined, sometimes unevenly ciliate, united to the middle with petiole, the lower ones narrower; leaves 3-foliolate; petioles hairy, 1–1.5 cm long, exceeding stipules; leaflets oblanceolate to obovate (in lower leaves), 1–1.5 cm long, with 10–15 pairs of distinct veins beneath, obscurely dentate and sometimes ciliate, obtusish or retuse, glabrate or with scattered hairs especially beneath, the lateral subsessile, the middle leaflet on petiolule 3–7 mm long; heads 8–15-flowered, loose; peduncles hairy, exceeding leaves; pedicels 1–2 mm long, glabrous or hairy, recurved in fruit; flowers 6–9 mm long; calyx glabrous or hairy, especially at tooth margins, the upper teeth subremote and about twice as long as tube, the lower twice to three times as long as the lateral, the middle tooth longest; standard 6–8 mm long, violet, tapering to a cuneate claw, the rounded-infundibular limb 5–8 mm broad, prominently nerved, unevenly denticulate, almost fringed laterally; wings spreading, lighter in color, 4–5 mm long; keel shorter still; petals retaining their shape in fruit and turning violet-brownish, the center of flower with more intense coloring; pod 1-seeded, 222 the stipe longer than the pod, the style about as long. Fl. May; fr. June.

Thickets on dry mountain slopes. – European part: Crim. (Ayudag submontane strip); Caucasus: S. Transc. (Megry area), Tal. (Perembel' and the Taug Gorge). **Gen. distr.**: E. Med., Bal.-As. Min. Described from Crete. Type in Berlin.

22. **T. strepens** Crantz, Stirp. Austr. V (1769) 411; Syreishch., Fl. Mosk. gub. IV (1914) 114; Grossg., Fl. Kavk. II, 271. – T. agrarium L. Sp. pl. (1753) 772, p. p.; Ldb. Fl. Ross. I, 556; Shmal'g., Fl. I, 246; Kryl., Fl. Zap. Sib. VII, 1611. – T. aureum Poll. Hist. Pl. Palat. II (1777) 344, non Thuill. – Ic.: Schlecht., Lang. u. Schenk, Fl. Deutschl. XXIV (1885) tab. 2404. – Exs.: HFR No. 864; Pl. Finl. exs. No. 764.

Annual; stems (10) 20–40 cm long, erect or ascending, simple or sparingly branched from the middle, covered with short appressed hairs; stipules elongate-lanceolate, acuminate, 1–1.5 cm long, with few inconspicuous veins, adnate to and covering the petiole to the middle; petioles glabrous or with scattered hairs, the free portion about as long as leaflets; persistent upon their shedding; leaves 3-foliolate; petiolules equal, very short; leaflets thin, oblong-obovate to cuneate, 1–1.7 cm long, with 12–20 pairs of veins, the margin obsoletely denticulate in upper part; heads numerous, axillary, on upper part of stems and branches, globose, mostly elongated, 1.5–2 cm long, rather compact, 25–40-flowered; peduncles hairy, 2–3 cm long, exceeding leaves; pedicels ca. 1 mm long; calyx 2.5–3.5 mm long, glabrous; teeth prominently nerved, sometimes tipped by one or two hairs, the lower three to four times as long as the upper; flowers yellow, finally brown and nodding, 5–6 mm long; standard ca. 5 mm long, keeled, attenuate and laterally compressed toward base, spoon-shaped above, much enlarged, conspicuously sulcate, the margins unequally toothed; wings somewhat spreading, equaling the keel, 3.5 mm long; pod 1-seeded; stipe nearly as long as pod, the style about half as long. Fl. June; fr. July.

Dry meadows, wood margins and openings, roadsides, riverbanks, mostly on sandy soil; sometimes a weed in fields. — European part: Kar.-Lap.(S.), Lad.-Ilm., Dv.-Pech., Balt., U.Dnp., U.V., V.-Kama, U.Dns., M.Dnp., V.-Don, Transv.(rare), Bl.(rare), L.Don (very rare), Crim.(S.); Caucasus: all regions; W.Siberia: Ob (very rare, vicinities of Tyumen, Tobol'sk, Yalutorovsk, Tara, Novosibirsk, and the village of Proskokov in the Tomsk area): Far East: Uss.(S.). **Gen. distr.**: all Europe, from Spain and Macedonia to Norway and Finland in the north. Described from Dornbach in S. Germany. Type in Vienna.

23. **T. campestre** Schreb. in Sturm, Deutschl. Fl. Heft XVI (1804) 13; Syreishch., Fl. Mosk. gub. II, 300; Grossg., Fl. Kavk. II, 271. — T. agrarium L. Sp. pl. (1753) 772, p.p. — T. procumbens L. Fl. Suec. (1755) 261, non Sp. pl.; Ldb. Fl. Ross. I, 556; Shmal'g., Fl. I, 246. — T. procumbens β campestre Ser. in DC. Prodr. II (1825) 205. — Ic.: Sturm, l. c.; Schlecht., Lang. u. Schenk, Fl. Deutschl. XXIII (1885) tab. 2405. — Exs.: HFR No. 865; Edit. Horti Bot. Petrop. No. 75; Fl. Polon. exs. No. 161; Fl. exs. reip. Boh.-Slov. No. 232.

Annual; stems (5) 10—25 cm long, ascending or erect, usually divaricate-branched, appressed-hairy; stipules asymmetrically ovate, acuminate, obscurely veined, ciliate, much shorter than adjoining leaf; leaves 3-foliolate, the upper imparipinnately 3-foliolate; petioles commonly longer than leaflets; petiolules short, the middle one borne on an extension of petiole 3—7 mm long and thus apparently longer than the lateral ones; leaflets 5—12 mm long, obovate-cuneate, sometimes subrhombic, with 6—10 pairs of veins, obscurely dentate in upper part, somewhat obtusish to subretuse; peduncles axillary, hairy, to 3 cm long, exceeding leaves; heads globose to ovaloid, 1—1.5 cm long, containing up to 30 flowers, these ca. 5 mm long, nodding in fruit; pedicels 1—1.5 mm long; calyx scarious, glabrous, ca. 2 mm long, the lower teeth about twice as long as the upper; corolla compressed, yellowish brown in fruit; standard ca. 5 mm long, prominently carinate and spoonlike, strongly sulcate, the margin obscurely fringed; wings much smaller, spreading; pod 1-seeded, about as long as stipe and three to four times as long as style. Fl. May—June; fr. June—July.

Mostly dry fields and meadows, river valleys, light and often sandy soils, and sands; in the north mostly among crops and in waste places; in the Caucasus and the Crimea often on gravelly slopes and on fluviatile deposits; in the S. regions of Centr. Asia mostly a weed. — European part: Lad.-Ilm. (Sivoritskaya station, imported), U.Dnp., U.V. (extreme S.), M.Dnp., V.-Don (W.), Bl., L.Don (rare), V.-Kama (a single location in the Argayash area of Bashkiria, between the villages of Gubernsk and Bairamgulova, where apparently imported), Crim. (mostly in the S.); Caucasus: all regions except the high-mountain and semidesert zones, in S. Transc. unknown from the Nakhichevan ASSR, and in Armenia south of Norbayazet; Centr. Asia: Syr D. (Tashkent), Kara K. (Krasnovodsk), Mtn. Turkm. (Kara-Kala District, Firyuza), Pam.-Al. (W. — Bal'dzhuan, Gissar, Kulyab, Stalinabad [Dushanbe], Kitab, Yangi-bazar, Zeravshan, Darvaz). **Gen. distr.**: Med., Centr. and Atl. Eur., Scand., Bal.-As. Min., Arm.-Kurd., Iran. Described from Germany.

24. **T. sebastiani** Savi in Diar. med. Flajani (1815) 14; Sebast. Fl. Rom. Prodr. (1818) 256; DC. Prodr. II, 206; Ldb. Fl. Ross. I, 557; Boiss. Fl. or. II, 155; Shmal'g., Fl. I, 246; Grossg., Fl. Kavk. II, 270. — Ic.: Sebast. l. c.

tab. V; Fiori e Paol. Ic. Fl. Ital. II, 239. — Exs.: Fl. cauc. exs. No. 67; Fl. Ital. exs. No. 462; Fl. exs. austr. hung. No. 422; Dörfl. Herb. norm. No. 4867.

Annual; stems procumbent or ascending, 5—30 cm long, puberulent or rarely glabrate, rather sparsely patent-branched; stipules narrowly lanceolate, acuminate, covering slightly less than half the petiole, sometimes irregularly and sparingly ciliate, distinctly veined; leaves 3-foliolate; petioles hairy, as long as to twice as long as leaflets; petiolules equal, very short, hairy; leaflets oblanceolate to obovate-lanceolate, 0.6—1.3 cm long, with 15—25 pairs of distinct veins, the margin denticulate and ciliate in upper two-thirds; heads mostly axillary at ends of branchlets, loosely 8—16-flowered, not spreading, finally pendent; peduncles usually not exceedin leaflets, hairy like the inflorescence axis; pedicels 2—3 mm long, puberulent; calyx glabrous, to 3.5 mm long; teeth three-quarters length of calyx, attenuate-pointed, with some cilia at tips, the upper shorter than the lower; corolla 3—4 mm long, slightly exceeding calyx-teeth, light yellow, in fruit reddish brown; standard broad-obovate, conduplicate, strongly carinate, conspicuously striate; wings and keel slightly shorter than standard; pod ovoid, coriaceous, ca. 2 mm long, 1-seeded, the stipe slightly longer than style. Fl. May; fr. June.

Dry slopes of foothills and dry oak woods. — Caucasus: Cisc. (E., Groznyi Dag., E. Transc. (Shusha), Tal. (Zuvant). **Gen. distr.**: Med. (Sicily, Centr. and S. Italy, S. Istria, in the Balkan Peninsula in the Dolope Pindus mountains, in Thessaly, and in the E. Rhodope in Bulgaria. Described from central Italy. Type in Italy.

25. **T. dubium** Sibth. Fl. oxon. (1794) 231. — T. minus Sm. in Relhan, Fl. Cantabr. ed. II (1802) 290; Shmal'g., Fl. I, 246. — T. filiforme L. Fl. Suec. ed. II (1755) 261, non Sp. pl.; Ldb. Fl. Ross. I, 557, p. p. — Ic.: Coste Fl. Fr. I (1901) 341. — Exs.: HFR No. 1661.

Annual; stems slender, procumbent or ascending, 10—40 cm long, more or less branched almost from base, rarely simple, mostly in upper part sparsely hairy; stipules acuminate from rounded base, with sparingly 225. ciliate-hairy margin, one-quarter to half length of petiole; leaves 3-foliolat leaflets 5—10 mm long, obovate-cuneate, thin, with 6—8 pairs of veins arising at an acute angle from midrib, in upper part obscurely dentate, retuse, the middle leaflet long-petioluled; heads loosely 5—15-flowered; peduncles to 4 cm long, arising from axils of and exceeding the median and upper cauline leaves; pedicels to 1 mm long; flowers finally nodding; calyx glabrous, ca. 2 mm long, the upper teeth longer and the lower shorter than tube; corolla 3—4 mm long, light yellow, finally yellowish brown; standard smooth, conduplicate, slightly carinate; wings facing forward; pod 1-seeded, short-stipitate, the style very short. Fl. and fr. June—July.

Dry meadows, fields, sands, and sometimes open pine woods; rarely a weed. — European part: U. Dnp. (S.), V.-Don (W., northward nearly to Tula), U. Dns., M. Dnp., L. Don (W.), Bl.; reports for the Crimea are unreliable. **Gen. distr.**: S. Scand., Atl. and W. Eur., Med. (from Spain to the Balkan Peninsula). Described from England. Type in London.

26. **T. micranthum** Viv. Fl. Libycae Spec. (1824) 45, tab. 19; Ser. in DC. Prodr. II, 206; Ldb. Fl. Ross. I, 557; Grossg., Fl. Kavk. II, 270. — T. filiforme L. Sp. pl. (1753) 773, p. p., non Fl. Suec. — Melilotus anomala

Ldb. in Bull. Ac. Sc. Pétersb. II (1837) 313. — M. microcarpus Balb. in Linnaea XV (1840) 90, non Rouy. — Ic.: Viviani l. c. f. 3; Hegi, Ill. Fl. IV, 3 p. 1289. — Exs.: Fl. Hung. exs. No. 684.

Annual; stems slender, procumbent or ascending, 5—30 cm long, commonly branched in lower part, glabrous; stipules oblong, acuminate, prominently veined, with irregularly ciliate-hairy margin, about equaling petiole; leaves 3-foliolate, the middle petiolule longer than the lateral; leaflets, obovate to cuneate, 4—10 mm long, with 6—8 pairs of veins arising at an acute angle from midrib, truncate or slightly retuse, the margin obscurely dentate in upper part; heads very loose, 3—8-flowered; peduncles filiform, hairy, 1—3 cm long, axillary, almost from base of stem; pedicels slender, glabrous, 1—2 mm long; flowers finally nodding; calyx glabrous, ca. 3 mm long, the lower teeth about twice as long as the upper, these longer than tube; corolla 2—3 mm long, yellow, turning yellowish brown; standard conduplicate, carinate, almost smooth; wings and keel shorter than standard; pod short-stipitate, short-beaked. Fl. May; fr. June.

Exposed sandy or gravelly places, mostly near the sea. — Caucasus:
6 W. Transc. (mainly the Black Sea coast, from Sochi to Batumi; in the Rion and Akhsu river valleys), Dag. (according to Grossheim), Tal. (Lenkoran).
Gen. distr.: Med. (to Canary Islands in the west), Atl. and S. Eur. Described from Cyrenaica and E. Libya. Type in Italy.

Section 7. **GALEARIA** Presl, Symb. bot. I (1832) 48, pro gen. propr.; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLI (1890) 3, pro sect.; Herm. in Fedde Repert. XXXIX (1936) 332, 336. — Vesicaria L. Sp. pl. (1753) 771, p. p. — Vesicastrum Ser. in DC. Prodr. II (1825) 202, p. p. — Flowers short-pediceled; bracteoles very small, scarious or herbaceous, lanceolate; calyx bilabiate, the upper part saccately enlarging in fruit, forming a scarious densely reticulate and more or less hairy bladder, the lower 3-toothed lip unchanged; corolla in some species resupinate, the standard almost free in all; perennial and annual plants.

27. **T. neglectum** C. A. M. in Suppl. ad Jnd. Sem. Nonum Horti Petrop. (1843) 21. — T. fragiferum auct. Fl. taur.-cauc., austro-turkest., mediterrann. nec non Boiss. Fl. or. II, 135, non L. — Exs.: Planta edita sub No. 875 in ser. "Flora italica exsiccata" huic speciei valde affinis.

Perennial, closely resembling T. fragiferum L. before and after flowering, but with some very distinctive characters: calyx 3.5—4 mm long, the teeth as long as tube; standard with almost obovate limb, its margins strongly involute, unequally toothed and emarginate at apex; limb of keel longer and more obtuse than in T. fragiferum; calyx also inflated in fruit, but much shorter, hence corolla in mature fruit always exceeding the inflated calyx by 2—2.5 mm, as opposed to T. fragiferum where it is completely included in the large bladdery calyx; fruiting heads oblong, 1.5—2.5 cm long and 1—1.5 cm broad, in contrast to the globose heads of T. fragiferum with a diameter of 2—3 cm; the two species are also readily distinguishable in fruit and are not likely to be confused. Fl. May; fr. June.

Wet solonetz meadows, hollows, banks of brooks and rivulets, mostly in the desert and semidesert zones, sometimes borders of irrigated fields and irrigation ditches. — European part: Bes., Bl. (vicinity of Odessa); Caucasus: all regions except the forest belt of W. Transc., infrequent in S. Transc.; Centr. Asia: Kara K., Mtn. Turkm., Amu D., Pam. -Al. (W.), Syr D. (W.), T. Sh. (W.). **Gen. distr.**: W. and E. Med., Bal. -As. Min., Arm. -Kurd., Iran. Described from the vicinity of Tbilisi. Type in Leningrad.

28. **T. fragiferum** L. Sp. pl. (1753) 772; M. B. Fl. taur. -cauc. II, 217, III, 50, p.p.; Ldb. Fl. Ross. I, 548, p. p.; Gib. et Belli in Mem. Acad. Sc. Torino, ser. II, XLI, 22, ex min. p.; Shmal'g., Fl. I, 242, Grossg., Fl. Kavk. II, 227 273, pro min. p. — T. ampullescens Gilib. Fl. Lith. (1781) 89. — Galearia fragifera Presl, Symb. bot. I (1832) 30. — Ic.: Hegi, Ill. Fl. IV, 3, tab. 164, 1. — Exs.: HFR No. 164; Fl. Polon. exs. No. 920. Pl. Finl. exs. No. 763. Vernacular name: pustoyagodnik.

Perennial; stems procumbent or ascending, rooting at lower nodes, commonly glabrous, 10—30 (40) cm long, sparingly branched; stipules pale, scarious, ovate-lanceolate, long-acuminate, on short shoots approximate and contiguous; leaves more or less hairy, the basal with petioles 5—10 cm long; petiolules short, hairy; leaflets ovate or elliptic, 1—2 cm long and 0.5—1.5 cm broad, glabrous or sometimes slightly hairy beneath, the numerous veins somewhat thickened and recurved near the denticulate margin; peduncles long, erect or ascending, hairy at summit; heads at first almost hemispherical, ca. 1 cm in diameter, in fruit globose and 2—3 cm broad, compact, many-flowered; involucre of later lanceolate often incised bracteoles, these sometimes exceeding adjoining calyces; bracteoles of inner flowers narrow, lanceolate, shorter, flowers 6—8 mm long, short-pediceled; calyx tubular, 4—5.5 mm long, slightly bilabiate, the teeth longer than tube, this mostly with dense hairs confined to upper part, the numerous nerves not visible above; corolla pink to carneous; standard oblong or elliptic with almost constant breadth throughout, scarcely retuse, the claw slightly united with those of other petals; wings narrowly lanceolate, longer than keel; keel about twice as broad as wings, obtuse; ovary 1—3-ovuled; fruiting calyx saccate in upper part, completely enclosing the corolla; pod ellipsoid, coriaceous, 1- or 2-seeded. Fl. May—June; fr. June—July.

Wet solonetz meadows in river valleys, banks of brooks, solonetz meadows and bogs. — European part: Kar. -Lap. (Kandalaksha). Lad. -Ilm. (Oshta, in river valley, Oshta area in the Leningrad Region), U. V. (Varnitsy, Rostov District of Yaroslavl' Region), Balt., U. Dnp. (S.), U. Dns., M. Dnp., V. -Don, Transv., V. -Kama (extreme S.), Bes., Bl., L. Don, L. V., Crim. (N. and W.); Caucasus: Cisc. (especially the Mineral'nye Vody area), Dag. (N.), W. Transc. (Sochi), E. Transc. (South Ossetia, Sgubiri); W. Siberia: U. Tob. (SW); Centr. Asia: Ar. -Casp., Balkh., Dzu. -Tarb., T. Sh., Syr D. (Fergana Valley), Kyz. K. (lower reaches of the Amu Darya). Gen. distr.: Dzu. -Kash., S. and Centr. Eur., S. Scand. Cultivated in the U. S. A. and Australia. Described from Sweden. Type in London.

Economic importance. The plant has been introduced as a pasture plant into the United States and Australia; it should certainly be submitted to trials in semidesert and desert areas.

228 29. **T. physodes** Stev. in M. B. Fl. taur. -cauc. II (1808) 217; Ldb. Fl. Ross. I, 550; Boiss. Fl. or. II, 136; Gib. et Belli in Mem. Acad. Sc. Torino XLI, 30; Grossg., Fl. Kavk. II, 273. — Ic.: Gib. et Belli l. c. I, 4 p.p.

Perennial; taproot fusiform, woody; stems few, mostly 3–5, ascending, sparingly branched, commonly glabrous, 15–25(40) cm long; stipules ovate-lanceolate, almost scarious at base, in free portion long-acuminate, glabrous, united with petiole to not more than one-third the length; basal leaves few, relatively small, with petiole 5–8 times length of leaflets; petioles of cauline leaves of similar length; terminal usually not exceeding leaflets, hairy at summit; petiolules short, hairy; leaflets obovate to ovate, 1–2 cm long and 0.8–1.5 cm broad, glabrous, the lateral veins prominent beneath near the unequally serrate-dentate margin; heads pseudoterminal, usually 1 or 2 at ends of stems, globose, 2–2.5 cm in diameter; peduncles overtopping adjoining leaflets; flowers pink, 11–14 mm long; calyx tubular, glabrous below, 15–20-nerved, densely hairy above; teeth subulate-linear, about as long as tube; upper part of tube accrescent in fruit, forming a scarious pyriform reticulate hairy sac, 6–8 mm long and 4–5 mm broad; standard 12–14 mm long, slightly more than twice the length of calyx, oblong, united only at the very base, the limb upcurved, obtusish or retuse; wings 11–12 mm long, narrowly lanceolate, ca. 10 mm long, acuminate; ovary glabrous, lanceolate; pod 2-seeded. Fl. May; fr. June.

Scrub and steppe sites in foothills and middle altitudes of mountains. — Caucasus: E. Transc. ("Iberiya"). **Gen. distr.:** Bal.-As. Min. (from Albania and Yugoslavia in the north through Asia Minor to Turkish Armenia). Described from Georgia. Type in Helsinki; cotype in Leningrad.

30. **T. raddeanum** Trautv. in A.H.P. X (1887) 105; Grossg., Fl. Kavk. II, 273. — T. rhodophysum Rupr. in sched.

Perennial, almost acaulescent, forming a rather compact small tuft; stems 2–3–4 cm long; stipules covering the stem, to 2 cm long, scarious, oblong-lanceolate, subulate-tipped, united almost throughout their length with petiole but only one-quarter to half its length; petioles glabrous; leaflets subsessile, to 1 cm long, mostly obovate to lanceolate, rarely orbicular, glabrous, with prominent midrib and lateral veins thickened toward margin, unequally denticulate; heads on axillary peduncles 5–9 cm long, solitary, to 25 mm broad, globose, loose, 12–20-flowered, without involucre, with scarious bracteoles of lower flowers at base; flowers short-pediceled, subtended by very small scarious bracteoles, 10–12 mm long; calyx bilabiate, ca. 4 mm long, densely woolly above; teeth less than half length of calyx, subulate-tipped, the upper 2 broad at base, almost ovate, twice to three times as broad as but slightly shorter than the lower teeth; corolla pink (?); standard almost free, 10–12 mm long, ca. 3 mm broad, oblong, broader at base, retuse at apex; wings ca. 8–9 mm long, lanceolate, slightly auriculate; keel ca. 5 mm long, lanceolate, acuminate; ovary sessile, lanceolate, with a broad style; fruiting calyx forming in upper part a scarious subglobose reddish sac, 7–9 mm in diameter, with scattered hairs, irregularly reticulate, at maturity almost completely enclosing the corolla; pod round, flat, scarious, 1-seeded. Fl. July; fr. August.

Middle and upper mountain levels; exact locations unknown. Caucasus: Dag. (mountainous Dagestan — known from three places: near Sumad on the Avarskoe Koisu River; between Karaktakh and Khushtad; between Aknod and Ratlu). Endemic. Described from the Avarskoe Koisu River. Type in Leningrad.

31. **T. tumens** Stev. in M. B. Fl. taur.-cauc. II (1808) 217; Ldb. Fl. Ross. I, 550; Boiss. Fl. or. II, 136; Gib. et Belli in Mem. Acad. Sc. Torino ser. 2, XLI, 34; Shmal'g., Fl. I, 242; Grossg., Fl. Kavk. II, 274. — Galearia tumens Presl, Symb. bot. (1832) 50.

Perennial; taproot slender; stems 20—40 (70) cm long, procumbent or ascending, rarely erect, slender, weak, glabrous; stipules ovate-lanceolate, adnate to petiole for half their length, pale, almost scarious, the free portion green, long-acuminate; basal leaves soon wilting, their petioles 6—10 times as long as leaflets; cauline leaves with shorter petioles; leaflets short-petioluled, obovate to obcordate, rounded at apex or retuse, glabrous, serrate-dentate especially about the middle; heads few, axillary, 10—13 mm broad, hemispherical, loose, with a kind of involucre formed by the scarious bracteoles of lower flowers; peduncles covered in upper part with short hairs, three to five times as long as leaves; flowers pale pink, 7—8 mm long, the lower on minute peduncles, the upper on longer ones and hence nodding; calyx densely hairy in upper part; tube thin, pale; teeth green, acuminate, shorter than tube; fruiting calyx with saccately inflated tube, 6 mm long and 5 mm broad, pale brownish, short-hairy, inconspicuously
230 reticulate; standard united only at the very base of the claw, oblong, with upcurved obtusish and unequally toothed limb, about twice as long as calyx; wings and keel lanceolate, much shorter than standard; ovary narrowly lanceolate, hairy, 2-ovuled. Fl. April; fr. May.

Forest glades, forest margins, and scrub. — Caucasus: all regions except W. Transc. **Gen. distr.**: Iran (NW). Endemic for the Caucasus and the adjoining part of Iran. Described from Georgia. Type in Helsinki.

32. **T. resupinatum*** L. Sp. pl. (1753) 771, s.l.; Ldb. Fl. Ross. I, 549, Boiss. Fl. or. II, 137; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLI, 10; Shmal'g., Fl. I, 242; Fedch., Rast. Turk. 510; Grossg., Fl. Kavk. II, 273. — T. suaveolens Willd. Hort. Berol. (1816) tab. 108; Ldb. l. c.; Grossg., l. c., p. 272. — T. resupinatum β majus Boiss. l. c.; Gib. et Belli l. c. p. 11. — T. clusii Gren. et Godr. Fl. Fr. I (1848) 414; Grossg., l. c., p. 272. — T. resupinatum γ minus Boiss. l. c., Gib. et Belli l. c. p. 11. — Galearia resupinata Presl, Symb. bot. (1832) 58. — Ic.: Willd. l. c.; Engl. Bot. 38, tab. 2789; Rchb. Ic. Germ. XXII, tab. 107; Gib. et Belli l. c., tab. I, 1. — Exs.: Fl. exs. Austro-Hung. No. 1222. — Vernacular names: klever persidskii [Persian], shabdar, shaftal.

Annual or overwintering annual; stems 10—30 (to 70) cm long, ascending or sometimes procumbent, smooth, succulent, often hollow, sparingly branched; stipules oblong-lanceolate, pale, coriaceous, united with petiole up to or slightly beyond the middle; lower leaves long-petioled, rosulately approximate, the upper subsessile; leaflets obovate, sometimes subrhombic, obtusish, 0.7—1.5 (2) cm long and 0.5—1 (1.5) cm broad, thin, succulent, with numerous distinct lateral veins, remotely denticulate; heads numerous, 0.7—1.5 cm broad, hemispherical, on peduncles exceeding leaves, in fruit globose and to 2 cm broad; bracteoles scarious, very small, not exceeding pedicel, the lower approximate and forming a coriaceous fringed involucre; flowers (3) 4–6 (7) mm long, pink to reddish violet, strongly fragrant, calyx pale green, with naked or sparsely and minutely glandular throat, densely villous outside in upper part and on the upper teeth; teeth half length of calyx or slightly less, triangular-subulate, 1-nerved, the lower somewhat longer; corolla finally turned upside down so that standard reposes on the lower calyx-teeth while the keel and wings are covered by the upper teeth; claws of petals united with staminal tube, this and ovary also inverted; standard elliptic, deeply emarginate and unequally denticulate, nearly three times as long as calyx and much longer than wings and keel; upper calyx teeth greatly enlarged in fruit, forming a bladdery scarious finely reticulate hairy ovoid sac, somewhat pointed and 2-awned by the forward-pointing upper calyx-teeth; lower calyx-teeth not accrescent and remaining appressed below the sac together with the marcescent corolla; pod inside the sac coriaceous, 1- or 2-seeded. Fl. April; fr. May.

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* From Latin resupinatus — upside down, inverted. This epithet was applied to the plant on account of the twist around the axis in the course of flower development that involves the corolla and all the inner flower parts, so that it undergoes inversion, with the standard facing downward and opposite the lower calyx-teeth.

Wet meadows near brooks, seaside sands, solonetzes; immigrant or cultivated in oases. — European part: Crim. (S.); Caucasus: Cisc. (Maikop), Dag. (S., coastal), W. and E. Transc.; Centr. Asia: immigrant or cultivated in oases of Amu D. (W.), Pam.-Al., and Mtn. Turkm. **Gen. distr.**: W. and E. Med., Bal.-As. Min. Described from England, where introduced. Type in London.

Economic importance. Cultivated in a few areas in the southern republics of Soviet Central Asia.

33. **T. tomentosum** L. Sp. pl. (1753) 771; M. B. Fl. taur.-cauc. III, 511; Ldb. Fl. Ross. I, 550; Boiss Fl. or. II, 138; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XLI, 17; Grossg., Fl. Kavk. 272. — Galearia tomentosa Presl, Symb. bot. (1832) 50. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 107; Gib. et Belli l. c. 1, 2.

Annual; stems often numerous, procumbent, rarely ascending, 10–20 cm long, glabrous or minutely puberulent; stipules oblong-ovate to lanceolate, acuminate, scarious, the upper much shorter than the lower; petioles glabrous or minutely puberulent, sulcate above, the lower somewhat longer than the upper; petiolules short, hairy; leaflets obovate or cuneate to suborbicular, truncate at apex, glabrous, dentate in upper two-thirds, paler and prominently veined beneath; heads numerous, axillary, at first hemispherical, finally globose; peduncles rather short, glabrous or puberulent; flowers short-stalked; bracteoles of lower flowers scalelike, approximate and forming a kind of involucre; calyx 8–12-nerved, glabrous or almost glabrous within, the upper teeth very densely grayish-woolly outside; fruiting calyx with inflated upper lip, spherically inflated, scarious, densely tomentose, with brownish or reddish reticulation showing through; upper teeth not forming hornlike projections, inconspicuous, recurved over the lower part of the fruit; lower calyx-teeth unchanged and not accrescent in fruit; corolla inverted, not more than twice as long as calyx; pod scarious, commonly 1-seeded. Fl. April; fr. May.

Coastal sands: Caucasus: E. Transc. (E.), Tal. (Lenkoran). **Gen. distr.**: E. and W. Med., Bal.-As. Min. Described from SE France. Type in London.

Subgenus 2. **LAGOPUS** Bernh. Syst. Verz. Pfl. Erfurt (1800) 228, pro gen.; Koch, Synopsis I (1837) 167, sect.; Lohac. in Nuovo Giorn. bot. Ital. XV (1883) 228; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX (1889) 1; Herm. in Fedde Repert. XLIII (1938) 318. — Flowers ebracteolate; calyx contracted by a callosity or closed or with a rather broad ring of hairs and not callous (very rarely throat of calyx almost naked. — T. lappaceum from the eastern extremity of the distribution area); pod 1-seeded, very rarely 2-seeded.

Section 1. **STENOSTOMA** Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX (1888) 99, pro max. p.; Herm. in Fedde Repert. Sp. nov. XXXIX (1936) 335; XLIII (1838) 319 p. p. — Throat of calyx contracted by a callous thickening; corolla caducous, mostly yellow or almost white, rarely pink.

34. **T. canescens** Willd. Sp. pl. III (1800) 1369; Lallem. in Ind. sem. H. Petrop. IX, 93; Ldb. Fl. Ross. I, 545; Boiss. Fl. or II, 117; Shmal'g., Fl. I, 240; Grossg., Fl. II, 279. — T. ochroleucum M. B. Fl. taur.-cauc. II (1808) 211, III (1819) 508, ex p., non al. — Ic.: Jaub. et Sp. Ill. or. III (1846) tab. 140; Bot. Mag. tab. 1169. — Exs.: Pl. or. exs. No. 338.

Perennial; taproot multicipital; stems 10—30 cm long, ascending, simple, covered with appressed white or sometimes brownish hairs; stipules 2—3 cm long, in united portion scarious, more or less hairy; in free portion herbaceous, green, lanceolate to linear, enlarged at base, hairy, 1-veined; basal petioles long, the cauline shorter; leaflets thin, ovate or obovate, 1.5—3 cm long and 1—2 cm broad, finely striated by numerous veins, diffusely appressed-hairy on both sides, commonly emarginate; heads terminal, solitary, short-peduncled, subtended by terminal leaves, 3—5 cm long, loose, ovoid, in fruit cylindric; flowers ca. 2 cm long, pale yellow; calyx tubular, the tube distinctly 10-nerved, with short appressed hairs; teeth narrowly lanceolate, acuminate, scarcely longer than tube, 1-nerved, hairy, the lowest slightly longer than the others; standard with a somewhat reflexed ligulate limb, emarginate, about twice as long as wings; keel scarcely shorter than 233 wings, with a lilac spot in upper part of the limb; pod obovoid, 1-seeded, coriaceous at top. Fl. June; fr. July.

Alpine and subalpine meadows. — Caucasus: all high-mountain regions, rare in Tal. **Gen. distr.**: E. part of As. Min., Arm.-Kurd., Iran. (NW). Described from Cappadocia. Type in Berlin.

35. **T. trichocephalum** M. B. Fl. taur.-cauc. II (1808) 212, III (1819) 508; Lallem. in Ind. Sem. H. Petrop. IX, 93; Ldb. Fl. Ross. I, 545; Boiss. Fl. or. II, 118; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 19; Shmal'g., Fl. I, 240; Grossg., Fl. Kavk. II, 277. — ? T. hohenackeri Jaub. et Sp. Ill. pl. or. (1846) 55, adnot. — Ic.: Gib. et Belli l. c. tab. IX, 3. — Exs.: Fl. orient. exs. No. 367.

Perennial; stems 3—5, erect, ascending at base, 30—70 cm long, simple or rarely somewhat branched, patulous-hairy, light-colored, usually hollow; stipules pale green, hairy, 2—3 cm long, the free portion broadly triangular-lanceolate; radical leaves long-petioled; leaflets oblong-ovate to lanceolate, often emarginate, sparsely covered with long appressed hairs; cauline leaves 3—5 per stem, their leaflets larger than those of basal leaves; median cauline leaves 4—18 cm long and 1.5—3 cm broad, oblong-ovate, subacuminate, with petioles 6–8 cm long; leaflets of terminal leaves lanceolate, acuminate; heads solitary, sessile, ovoid to globose, 5–8 cm long and to 5 cm broad, dense; flowers 2.5–2.8 cm long, pale yellow; calyx tubular; tube with dense long hairs, especially in upper part, the nerves not very prominent; teeth linear-subulate, obtusish to subtruncate, long-ciliate up to apex, arched-recurved in fruit, only the lowest tooth slightly longer than tube, half as long again as the others; standard acuminate, slightly exceeding wings, these much longer than keel; pod 1-seeded, cartilaginous at top. Fl. June; fr. July. (Plate XI, Figure 1).

Subalpine meadows. — Caucasus: all high-mountain regions except Tal. whence unknown. **Gen. distr.:** Arm.-Kurd., Iran. (Iranian Azerbaijan). Described from Georgia. Type in Leningrad.

Economic importance. Undoubtedly of interest for forage, deserves to be submitted to trials; apparently not inferior to Pannonian clover. Also of interest for ornament.

36. **T. pannonicum** Jacq. Obser. Bot. (1764) 21, tab. 42; L. Mant. II (1771) 276; Ldb. Fl. Ross. I, 544, ex p.; Gib. et Belli in Mem. Acad. Sc. Torino, ser. XXXIX, 115, ex p.; Shmal'g., Fl. I, 239, ex p.; Asch. et Graebn. Synopsis VI, 2, 583; Sokolovskii in Visn. Kyyivs'k. bot. sadu V–VI (1927). — Ic.: Jacq. l. c. tab. 42; Schlecht., Lang u. Schenk, Fl. Deutschl. XXIII, tab. 2374. — Exs.: Fl. exs. Austro-hung. No. 2815; Dörfl. Herb. Norm. No. 4859; Fl. ital. exs. No. 1075.

Perennial; stems 2 or 3, erect, ascending at base, 40–80 cm long, simple, rarely sparsely branched, with more or less spreading hairs, often brown; stipules hairy, pale green, often brownish, the lower in united portion 3–4 times as long as the upper, in free portion linear, 2–3 cm long; basal leaves elliptic, hairy, long-petioled; upper leaves lanceolate to narrowly lanceolate, 3–8 cm long and 1–2 cm broad, hairy on both sides, entire, only at summit obscurely dentate, the petiole shorter; heads solitary at ends of stems, ovoid to broadly cylindric, 4–7 cm long and 3–4 cm broad, dense; peduncles short, later elongating; flowers ca. 2.5 cm long, pale yellow; calyx campanulate; tube densely covered in upper part with long hairs, almost hirsute, the nerves not very prominent; teeth linear-subulate, about as long as tube, ciliate to almost plumose, setaceous, somewhat recurved in fruit, exposing the contracted throat, the lowest tooth at least twice as long as the others; standard acuminate, narrow, greatly exceeding wings, these slightly longer than keel; pod 1-seeded, cartilaginous at top; seed yellowish. Fl. July; fr. July–August.

Dry meadows, wood margins, and open woods. — European part: Lad.-Ilm. (Pushkin, Sivoritsy — introduced), U. Dns., M. Dnp. (Volhynia, Podolia, Vinnitsa). **Gen. distr.:** S. part of Centr. Eur. and N. part of Balkan Peninsula. Described from Hungary.

Economic importance. This species is cultivated for ornament and for forage in many parts of Central Europe; it is very hardy and drought-resistant.

37. **T. caucasicum** Tausch in Sylloge Ratisb. II (1828) 245; Boiss. Fl. or. II, 156. — T. marschallii Rouy in Rouy et Fouc. Fl. Fr. V (1889) 114. — T. pannonicum M. B. Fl. taur.-cauc. II (1808) 212, non L., nec Jacq.; Ldb. Fl. Ross. I, 544, ex p. — T. ochroleucum M. B. l. c., p. 211, ex p.,

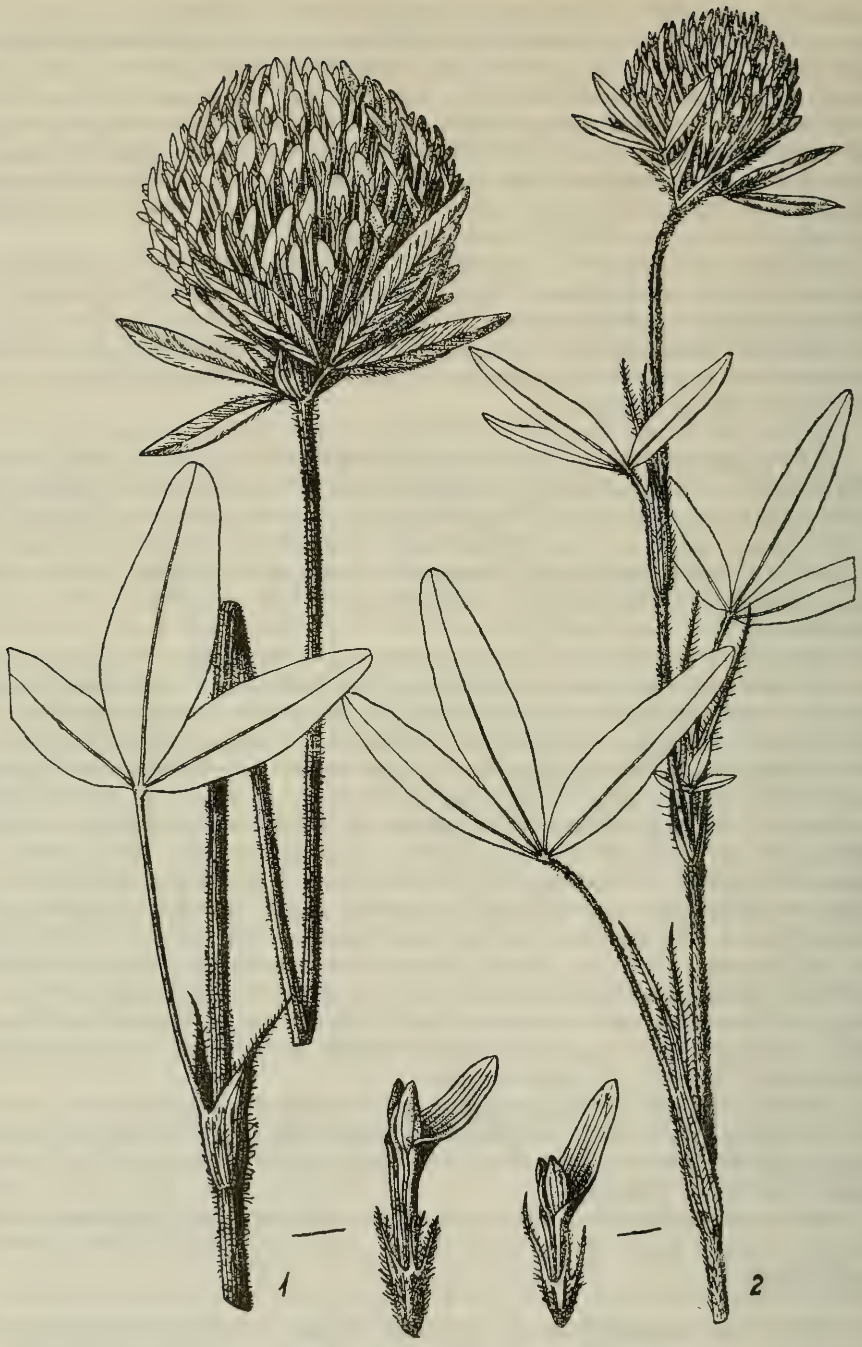

PLATE XV. 1 — Trifolium trichocephalum M.B., upper part of plant, flower; 2 — T. caucasicum Tausch., upper part of plant, flower.

non Huds. nec L.; Boiss. Fl. or. II, 116, ex p.— T. squarrosum M. B. l. c. p. 214, non L.; Boiss. l. c. 117.— T. inaequale Grossh., Fl. Kavk. II (1930) 279, non Lojac.— Exs.: Fl. cauc. exs. No. 66; sub nom. T. ochroleucum.

Perennial; stems few, ascending, branched, covered with short appressed hairs, 40—80 cm long; stipules lanceolate, hairy, scarious below, the free portion lance-linear, herbaceous, the margin long-ciliate; leaflets oblong- 37 elliptic to lanceolate, 2—6 cm long and 1—2 cm broad, appressed-hairy; heads solitary at ends of branches, ovoid, 2.5—4 cm long; peduncles short, later elongating; flowers 18—20 mm long; calyx-tube 6—8 mm long, ribbed, with scattered hairs, somewhat contracted below the teeth; calyx-teeth lanceolate, elongate-acuminate, ciliate, distinctly 3-nerved, the 4 upper teeth equaling or slightly longer than tube, the lowest twice as long; teeth of fruiting calyx deflexed, exposing the contracted hairy throat; corolla ca. 18 mm long, pale yellow, reddish after anthesis, finally brown; standard lanceolate, twice as long as other petals; pod ovoid, cartilaginous at top, 1-seeded. Fl. May; fr. June—July. (Plate XV, Figure 2).

Glades, mountain slopes, wood margins, and open woods.— European part: Bl. (Miusskoe forestry), Crim. (the wooded S. part); Caucasus: all regions except the high-mountain zone, rare in S. Transc. **Gen. distr.:** As. Min., Arm.-Kurd. Described from the Caucasus. Type unknown.

38. **T. ochroleucum** Huds. Fl. Angl. ed. 1 (1762) 283; Ldb. Fl. Ross. I, 544, ex p.; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 110, ex p.; Shmal'g., Fl. I, 240, ex p.; Asch. et Graebn. Synopsis VI, 2, 581; Sokolovskii in Visn. Kyyivs'k. bot sadu V—VI (1927).— Ic.: Schlecht., Lang u. Schenk, Fl. Deutschl. XXIII, tab. 2373.— Exs.: Fl. exs. austro-hung. No. 1215; Dörfl. Herb. Norm. No. 4860.

Perennial; stems 2 or 3, ascending, few-branched or simple, patulous-hairy in lower part, appressed-hairy above, bearing 3—5 leaves; stipules lanceolate, hairy, the free portion subulate-acuminate; leaflets oblong-elliptic to lanceolate, 1.5—5 cm long and 5—10 mm broad, appressed-hairy, the lower relatively short and broad, the uppermost narrowly lanceolate; heads usually solitary, ovoid, 2—3 cm long, subsessile or borne on a peduncle 1—3 cm long; flowers 15—18 mm long; calyx-tube 6—7 mm long, distinctly ribbed, hairy; calyx-teeth lanceolate, hairy, with a prominent midnerve and 2 sometimes obsolescent lateral nerves, the lowest tooth equaling the tube and one-third longer than the others, these shorter than tube, the 2 uppermost united; teeth of fruiting calyx stellate, exposing the contracted hairy throat; corolla ca. 15 mm long, pale yellow, after anthesis reddish brown, caducous; standard lanceolate, twice as long as wings and keel; pod ovoid, cartilaginous at top, 1-seeded. Fl. end of June; fr. July.

Wet meadows, forest margins, and open broadleaf forests.— European part: U. Dns., M. Dnp. (extreme W.— Volhynia and Podolia), Bes. **Gen. distr.:** Atl. and Centr. Eur., N. Med., Balkan Peninsula. Described from England. 38 Type in London.

39. **T. maritimum** Huds. Fl. Angl. ed. I (1762) 284; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 143; Shmal'g., Fl. I, 241; Asch. et Gr. Synopsis VI, 2, 587; Grossg., Fl. Kavk. II, 281.— T. commutatum Ldb. Fl. Ross. I (1842) 543.— Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 88; Gib. et Belli l. c. VIII, 1.— Exs.: Fl. Ital. exs. No. 1073.

Annual; stems solitary and erect or few and ascending, slightly branched or simple, hairy, 10–35 cm long; stipules linear-lanceolate, acuminate, with scattered hairs, the free portion longer than the united; petioles of basal leaves as long as or even shorter than those of upper ones; lower leaflets to 1 cm long, obovate; upper leaflets oblanceolate, usually acuminate, to 2 cm long and 1 cm broad, with scattered hairs, obscurely dentate in upper part; heads at first subsessile, finally on elongated hairy peduncles, at anthesis ovoid-lanceolate to subglobose, up to 1.5 cm long, in fruit ovoid, ca. 2 cm long; calyx ca. 10 mm long; tube pale, prominently nerved, glabrate except at throat and at base of teeth; teeth more than half the length of calyx, lanceolate, acuminate, 3-nerved, erect, dorsally hairy at base and at margin, the 2 uppermost somewhat united and about half length of the lowest; fruiting calyx somewhat accrescent; tube slightly longer than teeth, glabrous, yellow or light green, coriaceous, stiff; teeth dark green, herbaceous, substellate-spreading, exposing the contracted throat; corolla pink, surpassing the calyx-teeth; standard lanceolate; wings narrow, much shorter than keel; pod scarious, cartilaginous in upper part, 1-seeded; seeds obovoid, brown. Fl. May; fr. June. (Plate XVI, Figure 2).

Gravelly slopes of seashores and coastal sands. — European part: Crim. (S. coast); Caucasus: Tal. (Sari Island). **Gen. distr.:** Atl. and W. Eur., W. Med. Described from S. England. Type in London.

40. **T. leucanthum** M. B. Fl. taur.-cauc. II (1808) 214, III, 510; Ldb. Fl. Ross. I, 542; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 127; Shmal'g., Fl. I, 241; Boiss. Fl. or. II, 128; Asch. et Gr. Synopsis VI, 2, 592; Grossg., Fl. Kavk. II, 282. — T. stellatum Pall. Physik. Topogr. Gemälde Taur. (1796) 117, non L. — T. sachokianum Grossh. in Tr. po geobet. obsled. pastb. Azerb., ser. A, No. 7 (1931) 94. — Ic.: Gib. et Belli l. c. tab. VII, 1; Grossg., l. c. (1931), Plate VII.

Annual; stems few or solitary, ascending or suberect, sparsely branched, rarely simple, patulous-hairy, 10–25 (40) cm long; stipules narrow, with scattered hairs on the back and at margin, the linear-lanceolate free portion 239 about as long as the united; lower petioles longer than the upper; upper leaflets oblanceolate to cuneate, broadest in upper quarter, 1.5–2 cm long and ca. 1 cm broad, appressed-hairy on both sides, more heavily so beneath, the margin unequally dentate in upper third; upper leaves on shorter petioles, their leaflets shorter and broader, to obcordate; heads solitary, ovoid to conical or hemispherical, ca. 1.5 cm long, globose and somewhat larger in fruit; peduncles appressed-hairy, elongating in fruit; calyx 8–10 mm long, densely covered with brownish hairs; tube distinctly ribbed; teeth subulate, spreading, hairy, 1–3-nerved, subulate-tipped, longer than tube, the lower longer than the upper, in fruit stellate-spreading, exposing the contracted throat; corolla pale pink, scarcely surpassing the calyx; standard oblong-lanceolate, obtusish; wings acuminate; pod scarious, thin at top, 1-seeded; seeds ovoid, yellowish. Fl. May; fr. June (Plate XVI, Figure 3).

Scrub on gravelly mountain slopes. — European part: Crim. (S.); Caucasus: Cisc. (W. — Taman, Temryuk), E. Transc. (Shemakha). **Gen. distr.:** W. and E. Med., Bal.-As. Min., Arm.-Kurd. Described from S. Crimea. Type in Leningrad.

41. **T. squarrosum** L. Sp. pl. (1753) 763, non al., nec auct. Fl. Ross.; Asch. et Graebn. Synops. VI, 2, 593, ex p.

Perennial; stems few, sparsely branched, reddish, with scattered appressed hairs, ribbed, 10–20 cm long; stipules lanceolate, the free portion long-acuminate, 3–5-nerved, ciliate-margined; upper petioles about as long as leaflets, the lower longer; leaflets 1.5–2.5 cm long and to 1 cm broad, oblanceolate, obtusish and sometimes emarginate, with scattered hairs on both sides, densely hairy on midrib beneath and on margin, in upper third obscurely denticulate; heads few, solitary at ends of branches, subsessile or borne on short hairy peduncles, at anthesis ovoid to globose, ca. 1.5 cm long; flowers ca. 12 mm long; calyx-tube hirsute in upper part; upper calyx teeth as long as tube, the lowest twice as long and broad, slightly divergent at anthesis; standard much longer than the lowest calyx-tooth, hastate, distinctly dilated at base of limb; wings and keel scarcely exceeding the lowest calyx-tooth; fruiting heads ovoid, to 2 cm long and 1.5 cm broad, apparently shaggy and spiny due to the large deflexed lowest calyx-teeth; fruiting calyx much enlarged, the tube somewhat contracted at summit; teeth substellately arched-recurved, 3-nerved, the lowest with sometimes obsolescent marginal nerves, the throat contracted; pod scarious, indurated at summit, 1-seeded; seeds ovoid, yellowish brown, ca. 2 mm long. Fl. June; fr. July.

European part: Bl. (collected on coastal cliffs near Odessa, adventive). **Gen. distr.:** W. Med. Described from Spain. Type in London.

42. **T. echinatum** M. B. Fl. taur.-cauc. II (1808) 216, III, 511; Ldb. Fl. Ross. I, 541; Boiss. Fl. or. II, 126 excl. var.; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 135; Asch. et Gr. Synopsis VI, 2, 589; Grossg., Fl. Kav. II, 281. — T. supinum Savi Obs. Trif. (1810) 46. — Ic.: Rchb. Ic. Fl. germ. XXII, tab. 90; Gib. et Belli l. c. tab. VII, 3. — Exs.: Fl. exs. austro-hung. No. 16.

Annual; stems few, branched almost from base, angled, with scattered appressed hairs, 30–60 cm long; stipules linear-lanceolate, at base pale chartaceous, the free portion green, 2- or 3-veined, the margin beset with long spreading cilia; upper petioles short, the lower much longer; petiolules minute; leaflets subappressed-villous on both sides, the lower obcordate, to 1.5 cm long, the upper oblong-obovate to oblanceolate; heads solitary at ends of branches, pseudoterminal, usually overtopping adjoining leaflets, ovoid or conical, 1–2 cm long, upon anthesis of upper flowers obovoid; peduncles hairy, initially short, later elongating; flowers sessile, ca. 12 mm long, pink; calyx at first obconic, in fruit campanulate, hirsute, more densely in upper part, 10-nerved, the throat contracted in fruit and bearing few hairs; teeth subulate-pointed longer than tube, the lowest twice as long as the others; teeth of fruiting calyx stellate, with pod exserted from the exposed contracted throat, the head acquiring a spiny aspect; corolla twice as long as calyx; standard spatulate, obtusish, much longer than wings and keel; pod scarious below, cartilaginous in upper part; seed solitary, yellowish, obovoid. Fl. June; fr. July.

Seacoasts, turf and scrub slopes of the submontane zone and foothills. — Caucasus: W. Transc. (Batumi, Duripsh), E. Transc., Tal., Dag. (S., coastal). **Gen. distr.:** E. Med., Bal.-As. Min. Described from Transcaucasia. Type in Leningrad.

43. **T. angustifolium** L. Sp. pl. (1753) 769; M. B. Fl. taur.-cauc. II, 213; Ldb. Fl. Ross. I, 540; Boiss. Fl. or. II, 122; Gib. et Belli in Mem. Acad. Sc. 241 Torino, ser. 2, XXXIX, 99; Asch. et Graebn. Synopsis VI, 2, 579; Grossg., Fl. Kavk. II, 283. — Ic.: Sibth. et Sm. Fl. Gr. tab. 749; Gib. et Belli l. c. tab. VI, 1. — Exs.: HFR No. 312; Fl. exs. austro-hung. No. 421.

Annual; stems solitary or 3—5, erect, simple, sometimes ascending at base, appressed-hirsute; stipules in scarious united portion linear-lanceolate, in free portion linear-subulate, the margin bristly-ciliate throughout; petioles hirsute, the lower longer than the upper; petiolules short, hirsute; leaflets linear to lance-linear, to 8 cm long and to 4 mm broad, more densely appressed-hirsute beneath; heads solitary, spicate, 3—10 cm long and 1.5—2.5 cm broad, on appressed-hirsute peduncles; flowers numerous, 12—14 mm long, pink or purple; calyx-tube 5—6 mm long, tubular, 10-nerved, densely hirsute, contracted at throat by callosities; calyx-teeth triangular-subulate, acuminate, bristly, about as long as tube except the somewhat longer lowest tooth, stellate-spreading in fruit; corolla exceeding calyx by not more than 2—3 mm, the petals united to about one-third; standard lanceolate, slightly enlarged in middle part, exceeding wings by 3 mm, these scarcely longer than keel; pod scarious, cartilaginous at the very top; seed solitary, globose, brown. Fl. June; fr. July.

Dry slopes of low mountains, scrub, and wood margins. — European part: Crim. (S. northward to Simferopol'); Caucasus: Dag. (S., coastal), W. Transc. (coastal districts from Anapa to Sukhumi), E. Transc. (E.), Tal. **Gen. distr.:** W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. (W.). Described from Italy. Type in London.

Section 2. **PROSBATOSTOMA** Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX (1888) 19, ex min. p. — Throat of calyx contracted by callosities, the tube with round or elliptic opening, rarely throat closed by ring of hairs (T. stellatum L.); pod scarious, with coriaceous or cartilaginous top, rarely scarious throughout.

44. **T. stellatum** L. Sp. pl. (1753) 769; Ldb. Fl. Ross. I, 544; Boiss. Fl. or. II, 121; Gib. et Belli in Mem. Acad. Sc. Torino, ser. II, XXXIX, 51; Grossg., Fl. Kavk. II, 280. — Ic.: Sibth. et Sm. Fl. Gr., 750; Gib. et Belli l. c. tab. III, 1. — Exs.: Edit. Horti Bot. Petrop. No. 68; Fl. exs. austro-hung. No. 1217; Fl. Palaest. exs. No. 137.

Annual; stems 10—20 cm long, ascending or erect, commonly simple, with spreading silky hairs; petioles patulous-hairy, the lower longer; stipules 242 asymmetrically obovate, in lower part scarious, dentate in upper part, sericeous, the upper larger; leaflets sessile, cuneate-obovate, in upper part unequally denticulate, appressed-sericeous, more densely beneath; heads terminal, solitary, globose, rather loose, 2—2.5 cm long, larger in fruit; peduncles patulous-hairy; calyx tubular-obconic, 10-nerved, almost ribbed, densely villous, the throat densely hairy; teeth subequal, at anthesis erect, in fruit enlarged at base and stellate-spreading; corolla ca. 10 mm long, reddish, finally yellowish, shorter than calyx-teeth; standard narrowly lanceolate, acuminate, greatly exceeding other petals; ovary short-stipitate, obovoid, 1-ovuled; pod scarious with coriaceous top; seed solitary, ellipsoid. Fl. April; fr. May.

Caucasus: Dag. (Derbent), W. Transc. **Gen. distr.:** W. and E. Med. Described from Sicily. Type in London.

Note. Exceedingly rare in the USSR and so far known only from the vicinity of Derbent (on the road to Sabnov village), whence collected by Alekseenko. The report for W. Transcaucasia, based on Nordmann's specimen (in provinc. Transcauc. occid.) does not indicate the precise location; Ledebour (l.c.) states that the plant originates near the Turkish border.

45. **T. molineri*** Balb. Cat. horti Acad. Taurin. (1813) App. I, 17, nomen. — T. incarnatum β molinerii DC. Fl. Fr. V, vol. VI (1815) 556; Ej. Prodr. II, 190; Boiss. Fl. or. II, 122; Posp. Fl. Oesterr. Küstenl. II, 379; Asch. et Gr. Synopsis VI, 2, 545. — Ic.: Cesati in Linnaea XXXII (1863) tab. II. — Exs.: Fl. Ital. Exs.: No. 873.

Annual; stems solitary or few, 10—40 cm long, erect or slightly ascending, mostly simple, densely hairy; basal leaves long-petioled; cauline short-petioled; leaflets obovate-cuneate to orbicular, truncate at summit, to 1.5 cm long, dentate in upper part, hairy on both sides; stipules subcoriaceous, pale green or yellowish below, sometimes lilac-tinged at apex, prominently veined, hairy, the upper subovate, obtuse; peduncles long, appressed-hairy; heads solitary, at first nodding, ovoid, becoming conical to subcylindric, erect, to 4 cm long and 2 cm broad; flowers numerous, ca. 10 mm long, sessile, yellowish or pinkish; calyx tubular-obconic, densely clothed with brown hairs, 10-nerved; teeth up to nearly twice as long as
3 tube, erect, sublinear, hairy; fruiting calyx with callous-thickened throat and stellate-spreading teeth; corolla often caducous at maturity; standard oblong-elliptic, acuminate, dentate, much longer than other petals; wings with a large round auricle; pod ovoid, scarious, with cartilaginous top; seeds globose, yellowish brown. Fl. May; fr. June.

Herbaceous slopes and open woods. — European part: Crim. (S. coast). **Gen. distr.:** W. and E. Med., Balkans. Described from Turin. Type in Turin (?).

46. **T. incarnatum** L. Sp. pl. (1753) 769 p.p. — T. incarnatum var. β Cesati in Linnaea XXXII (1863) 203. — T. incarnatum β elatius Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX (1889) 54; Asch. et Gr. Synopsis VI, 2, 545. — T. incarnatum α sativum Ducommun, Taschenbuch (1869) 169. — Ic.: Bot. Mag. X, tab. 328; Sibth. et Sm. Fl. Gr. tab. 748; Gib. et Belli l. c. tab. II, 4. — Exs.: Hayek, Fl. Styr. No. 129.

Annual, often overwintering, closely resembling in aspect the preceding species; distinguishable by the intensely flesh-colored flowers (not yellowish or pinkish), denser inflorescence, and calyx-teeth scarcely longer than tube; plant as a whole vigorous, softly hairy; stems solitary, stouter, simple; leaflets larger; seeds ovaloid, compressed yellowish; flowers very rarely plain white. Fl. May—June; fr. June.

Cultivated, sometimes unintentionally introduced. — European part: U. Dns. (rarely cultivated, sometimes escaped), adventive in other regions, such as Dv.-Pech. (Ust-Tsil'ma), U. V. (Rybinsk); Caucasus: W. Transc. (cultivated along the Black Sea coast), Tal. (introduced). **Gen. distr.:** Atl. and S. Eur.; cultivated in the U. S. A. Described from Italy. Type in London.

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* Named for the Turin botanist Ignazio Molineri.

Economic importance. A good plant for grazing, forage, and green manure, deserving to be more widely cultivated in W. Ukraine, Transcaucasia, and the Crimea.

47. **T. phleoides** Pourr. in Willd. Sp. pl. III (1800) 1377; Boiss. Fl. or. II, 120; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 37; Shmal'g., Fl. I, 237; Grossg., Fl. Kavk. II, 281. — T. erinaceum M. B. Fl. taur.-cauc. III (1819) 510; Ldb. Fl. Ross. I, 542.

Annual; stems sometimes 2 or 3 together from base, erect, usually simple sulcate, 5—30 cm long, appressed-hairy; stipules oblong, asymmetrical, hairy, prominently veined, sometimes lilac-tinged at apex; leaflets subsessile, the lower shorter, obovate, those of upper leaves tending toward 244 cuneate or oblanceolate, obtusish, sometimes mucronulate, obscurely dentate, hairy, the margin ciliate; heads pseudoterminal and axillary, before anthesis oblong-ovoid to subconical, in fruit cylindric, to 2.5 cm long and 1 cm broad; peduncles fairly long; flowers 6—8 mm long; calyx 10-nerved, tubular-obconic, hairy; calyx-teeth to half somewhat less than half the length of calyx, narrowly triangular prominently 1-nerved, commonly hairy, scarious-margined below, stellate in fruit, exposing the hairs projecting from throat; corolla pale pink, exceeded by calyx-teeth; standard with spatulate limb, slightly dentate at summit; wings semicordate, with a large auricle, shorter than standard; keel obtusish, not auriculate; pod scarious with cartilaginous top, 1-seeded. Fl. May—June; fr. July.

Dry mountain slopes, scrub, and gravel; rare. — European part: Crim. (S. coast, rare); Caucasus: Cisc. (Mineral'nye Vody), E. Transc., Tal. **Gen. distr.:** W. and E. Med., Bal.-As. Min. Described from Spain. Type in Berlin (?).

48. **T. scabrum** L. Sp. pl. (1753) 770; M. B. Fl. taur.-cauc. II, 215; Ldb. Fl. Ross. I, 542; Boiss. Fl. or. II, 130; Gib. et Belli in Mem. Acad. Sc. Torino, ser. I, XXXIX, 44; Shmal'g., Fl. I, 236; Asch. et Gr. Synopsis VI, 2, 540; Grossg., Fl. Kavk. II, 280. — Ic.: Hegi, Flora IV, 3, Fig. 1410.

Annual; stems almost prostrate or ascending, sparsely branched, appressed-hairy, 5—20 (30) cm long; lower leaves relatively long-petioled, the upper subsessile; stipules lanceolate, elongate-acuminate, hairy, coriaceous, usually purple-tinged along the veins, hairy, those subtending the head broad, ovate, short-acuminate; leaflets short-petioluled, stiffish, obovate to cuneate, truncate at apex, hairy on both sides, more densely beneath, the margin ciliate; the lateral veins arching backward and thickened toward the margins (this being a useful characteristic distinguishing young plants of this species from those of T. striatum); heads axillary and pseudoterminal, few-flowered, subovoid to cylindric, 1—1.5 cm long; flowers sessile, 6—7 mm long; calyx coriaceous, the tube subcylindric, short-hairy, prominently 10-nerved, with callous-thickened oval throat; teeth about as long as tube, lanceolate, spinescent, somewhat keeled, hairy, spreading in fruit; corolla slightly exceeded by calyx-teeth, pale purple; standard with hastate limb, obtusish; pod ovoid, scarious, 1-seeded, included in the indurated fruiting calyx; seed brownish. Fl. May; fr. June.

245 Dry gravelly slopes of the submontane and low-mountain zones, on gravel and sand, as a component of ephemeral vegetation. — European part: Crim. (S. coast); Caucasus: submontane zone and plains in all regions (rare in

W. Transc., not reported for S. Transc.). **Gen. distr.**: Atl. and S. Eur., W. and E. Med., Bal.-As. Min., Iran. ([former] Astrabad Province). Described from Atlantic Europe. Type in London.

49. **T. striatum** L. Sp. pl. (1753) 770; M. B. Fl. taur.-cauc. II, 215; Ldb. Fl. Ross. I, 542; Boiss. Fl. or. II, 130; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 21, XXXIX, 19; Shmal'g., Fl. I, 236; Asch. et Gr. Synopsis VI, 2, 527; Grossg., Fl. Kavk. II, 279. — Ic.: Gib. et Belli l. c. tab. I, 1; Hegi, Flora IV, 3, fig. 1409. — Exs.: Fl. cauc. exs. No. 363.

Biennial or annual; stems 5–30 cm long, densely puberulent, almost prostrate or ascending or erect, usually sparingly branched; lower petioles relatively long, the upper short; stipules ovate, coriaceous, pale, point-tipped; leaflets obovate to cuneate, 1–1.5 cm long, denticulate in upper third, truncate at summit, densely sericeous on both sides, the veins straight and not thickened at ends; heads pseudoterminal, few-flowered, ovoid, ca. 1 cm long, later somewhat elongating, surrounded by large-foliolate terminal leaves; flowers ca. 6 mm long, sessile; calyx pale, with 10 very prominent and more intensely green nerves, rather densely covered outside with short hairs, glabrous within, the throat somewhat contracted by a callous ring; calyx-teeth lance-subulate, becoming spinescent, the lower about equaling tube, the upper shorter; corolla about equaling calyx-teeth, pink, sometimes caducous; standard free, lanceolate, obtusish; wings semisagittate; keel obtusish; ovary obovoid, subsessile, 1-ovuled; pod scarious; seed solitary, brownish. Fl. May; fr. June.

Dry grassy slopes of the lower mountain zone, scrub, glades, and open woods. — European part: Crim. (S. to the Kerch Peninsula); Caucasus: all regions except S. Transc., infrequent in Cisc. **Gen. distr.**: Centr. and S. Eur., Med., Balkan Peninsula. Described from S. Europe. Type in London.

Section 3. TRICHOSTOMA Bobr. — Throat of calyx not callous-thickened, with a broad dense ring of hairs and sometimes also a more or less distinct annular coriaceous fold of epidermis; corolla persistent, in various shades of red, very rarely yellow.

Subsection 1. INTERMEDIA Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX (1889) 87, pro sect. — Macrobiotum Herm. in Fedde Repert. XXXIX (1536) 349 ex min. p. — Throat of calyx with only a ring of hairs; pod scarious, devoid of cartilaginous top or operculum, dehiscing by a lateral slit. Perennials, often rhizomatous.

50. **T. medium** L. Fauna Suec. ed. 2 (1761) 558, nomen; Huds. Fl. Angl. ed. 1 (1762) 284; M. B. Fl. taur. cauc. III, 508; Ldb. Fl. Ross. I, 547; Boiss. Fl. or. II, 114; Shmal'g., Fl. I, 238; Grossg., Fl. Kavk. II, 284; Kryl., Fl. Zap. Sib. VII, 1603. — T. flexuosum Jacq. Fl. austr. IV (1776) 45; Rupr. Fl. Ingr. I (1860) 257; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 87. — T. medium A. flexuosum Asch. et Gr. Synopsis VI, 2 (1908) 567. — T. medium var. bithynicum Busch in A. H. P. XXVI (1906) 66. — T. sarosiense Grossh., Fl. Kavk. II (1930) 284, haud dubie etiam Hazsl. — Ic.: Gib. et Belli l. c. tab. V; Rchb. Ic. Fl. Germ. XXII, tab. 84; Hegi, Ill. Fl. IV, 3, f. 1342. — Exs.: Fl. Pol. exs. No. 158; Pl. Finl. exs. No. 274, 761; Fl. exs. austro-hung. No. 3202; Fl. cauc. exs. No. 65.

Perennial with straight multicipital taproot, often strongly rhizomatous; stems 20–50 cm long, sparsely branched or simple, divaricate or more or less ascending, zigzagging at nodes, glabrate or appressed-hairy; stipules lanceolate, subcoriaceous, green, united with petiole to about the middle, the free portion lanceolate, long-acuminate, sometimes slightly ciliate; upper petioles short, the basal longer; leaflets short-petioluled, elliptic to broadly lanceolate, 1.5–6 cm long and 0.6–3 cm broad, entire or unequally denticulate, commonly glabrous, somewhat glaucescent beneath, the margin sometimes sparsely hairy, the lateral veins eroded-recurved toward margins; heads solitary at ends of branches, broad-ovoid to globose, at first subsessile and subtended by terminal leaves, later on peduncles 3–4 cm long, loose; flowers 15–18 mm long, bright red; calyx-tube 5–6 mm long, 10-nerved (occasionally some flowers in same head 12–20-nerved), pale, glabrous outside, the throat with a broad dense ring of hairs; calyx-teeth green, subulate, 1-nerved, ciliate, the uppermost pair usually not exceeding the tube, the lateral slightly longer, the lowest twice as long as the tube; corolla united into a tube 8–10 mm long, persistent; standard oblong-ovate, slightly upcurved; wings slightly shorter than standard, ovate, strongly auriculate, exceeding keel; pod ovoid, scarious, dehiscing by a lateral slit, 1-seeded. Fl. May–July; fr. June–August.

Scrub and wood margins, open woods, sometimes fallows; in mountains rarely rising into the subalpine zone. – European part: all regions, in Kar.-Lap. northward to the N. end of Lake Onega, in Dv.-Pech. as far as Arkhangel'sk and Ust-Lyzha on the Pechora River; Caucasus: all regions 247 except deserts and high mountains; W. Siberia: Ob (S., rare, eastward to Tomsk), U. Tob., Irt. (Omsk), in E. regions of W. Siberia apparently introduced; E. Siberia: Ang.-Say. (Irkutsk, introduced). **Gen. distr.**: Scand., Atl., Centr. and S. Eur., Med., Bal.-As. Min., Arm.-Kurd., NW Iran. Described from S. Sweden. Type in London.

Economic importance. A forage plant; when young, readily eaten by all kinds of livestock, later becoming coarse. The practical value of this species has not yet been sufficiently ascertained.

51. **T. alpestre** L. Sp. pl. ed. 2 (1763) 1082; M. B. Fl. taur.-cauc. II, 211; Ldb. Fl. Ross. I, 546; Boiss. Fl. or. II, 113; Shmal'g., Fl. I, 239; Asch. et Graebn. Synopsis VI, 2, 575; Grossg., Fl. Kavk. II, 284. – Ic.: Rchb. Ic. Fl. germ. XXII, tab. 2135; Gib. et Belli l. c. tab. V, 5. – Exs.: HFR No. 1659, 4b; Fl. Polon. exs. No. 719.

Perennial; taproot descending deep into the soil, sometimes multicipital, with long and often branched rhizomes; stems several, 15–50 cm long, erect or ascending, usually simple, more or less appressed-hairy; stipules large, lanceolate, hairy, united with petiole to beyond the middle, prominently veined, the free portion subulate, the margin ciliate; leaves mostly cauline, the lower long-petioled, the upper short-petioled; leaflets lanceolate to narrow-elliptic, 1.5–6 cm long and 0.5–1.5 cm broad, acuminate, unequally denticulate, densely appressed-hairy especially beneath, the lateral veins attenuate at margins; heads solitary or sometimes paired, surrounded by terminal leaves, subsessile or short-peduncled, ovoid, 3–5 cm long, densely many-flowered; flowers dark red, ca. 1.5 cm long, calyx slenderly 12-nerved; tube ca. 6 mm long, pale green, hairy, with a dense ring of hairs at throat; teeth subulate, ciliate, the upper one-third to half the length of tube, the lowest at least twice as long as tube; corolla united for two-thirds its length; standard broad-ovate; wings and keel lanceolate, scarcely shorter than standard; pod ovoid, scarious, 1-seeded. Fl. June—July; fr. July—August.

Foothills and middle mountain zone, dry meadows, steppes, scrub, sometimes ascending into the subalpine zone; in plains, dry meadows, forest margins, open forests, and scrub. — European part: U.V., V.-Kama (Talitskii Zavod, introduced), Balt., U.Dnp., U.Dns., M.Dns., V.-Don, Transv., Bl., L.Don, Crim. (mountains); Caucasus: all regions except W.Transc. **Gen. distr.**: S. and Centr. Eur. Described from Europe. Type in London.

52. **T. rubens** L. Sp. pl. (1753) 768; Ldb. Fl. Ross. I, 546; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 95; Shmal'g., Fl. I, 239; Asch. et Graebn. Synopsis, VI, 2, 574; Hegi III. Fl. IV, 3, 1346. — Ic.: Gib. et Belli l. c. tab. V, 6; Rchb. Ic. Fl. Germ. XXII, tab. 86. — Exs.; Dörfl. Herb. Norm. No. 5028.

Perennial; taproot long, strong; stems few, 20—80 cm long, mostly simple, rigid, glabrous, faintly reddish, profusely leafy; stipules glabrous, very large, often longer than petioles and even overtopping leaflets, united with petiole for most of their length, the free portion lanceolate; calyx approximately equaling leaflets; leaflets oblong-lanceolate, 4—8 cm long and 1—1.5 cm broad, subacuminate, unequally denticulate, with a dense network of lateral veins, these thickened toward margin; heads at ends of stems, solitary or paired and then second head smaller, ovoid to subcylindric, 4—10 cm long and 2—3.5 cm broad, dense, short-peduncled; flowers 1.3—1.6 cm long; calyx tubular; tube 5—6 mm long, slenderly and inconspicuously 20-nerved, yellowish, glabrous, the throat contracted by a dense ring of hairs; teeth herbaceous, hirsute, lanceolate, 1-nerved, the upper and lateral three-quarters length of tube; corolla reddish, 1.3—1.5 cm long, united into a tube to two-thirds; standard ovate in free part, somewhat recurved, scarcely exceeding wings, these scarcely longer than keel, narrowly lanceolate, with a conspicuous fleshy auricle; pod ovoid, scarious, not cartilaginous at top, 1-seeded. Fl. June; fr. July.

Meadows, forest margins, and scrub. — European part: U.Dns., U.Dnp. (SW), M.Dnp. (W.: Volhynia and Podolia); reports for the former Tavricheskaya Province and for Sarepta (now Krasnoarmeisk) are apparently due to confusion of labels; the same may be noted as regards reports for S.Transc. **Gen. distr.**: S.Eur., from Spain to N. part of Balkan Peninsula, S. part of Centr. Europe. Described from Italy. Type in London.

Subsection 2. LEIMONOPHYLLUM Herm. in Fedde Repert. Sp. nov. XXXIX (1936) 335; XLIII (1938) 318. — Pratensia Gib. et Belli in Mem. Ac. Sc. Torino, ser. 2, XXXIX (1888) 58, pro stirpe. — Throat of calyx densely hairy and with an annular fold of epidermis; pod scarious, cartilaginous at apex (apparently operculate). Perennials, not rhizomatous, rarely biennials or annuals.

53. **T. pratense** L. Sp. pl. ed. 1 (1753) 768 s. str., quoad pl. spont.; Ldb. Fl. Ross I. 547 p. p.; Turcz. Fl. baic.-dahur. I, 280; M. B. Fl. taur.-cauc. II, 211; Shmal'g., Fl. I, 238 p. p. — T. pratense α spontaneum Willk. Führer ins Reich ed. I (1863) 535. — T. pratense var. β collinum Gib. et Belli in Mem. R. Acad. Sc. Torino, ser. 2, XXXIX (1880) 60. — T. pra-

tense subsp. A. eu-pratense a. spontaneum Asch. et Graebn.
249 Synopsis VI, 2 (1908) 548. — Ic.: Hegi Fl. Mitt.-Eur. IV, 3 tab. 162; Ib. f. 1414. — Exs.: Pl. Finl. exs. No. 760; Meinsh. Herb. Fl. Ingr. No. 97.

Perennial, short-lived (2—3 years) in the SW part of the European USSR, long-lived throughout the taiga belt and high mountains of the South; root profusely branched, with bacterial nodules on ultimate ramifications; plants, especially in the taiga belt, sometimes almost rosulate by profusion of basal leaves; stems (actually terminal branches in absence of a developed main axis) mostly 2—5, ascending (hence plant somewhat sprawling), 15—40 cm long, at first patulous-hairy, especially under the nodes, finally with scattered hairs; stipules ovate, elongate-acuminate, sometimes hairy; leaves 3-foliolate, the lower long-petioled, the upper short-petioled; leaflets more densely hairy beneath, the lower broad-obovate, the upper elliptic or ovate; heads mostly 1 or 2 at ends of stems, rounded-oblong or ovoid, 30—70-flowered, usually subtended by terminal leaves and their enlarged stipules, rarely pedunculate; flowers 11—14 mm long, sessile; calyx tubular-campanulate, light green or brownish, 10-nerved, in upper part hirsute; calyx-teeth narrow, erect, the lowest much longer than the others; corolla light to dark-carneous, sometimes lilac, rarely plain white, the claws united into nectariferous tube, 7—10 mm long; standard cuneate or spatulate, obtuse, emarginate, wings with saccate projections at base of claw, these clasping the tube; ovary sessile, 1- or 2-ovuled; pod commonly 1-seeded, ovoid, in upper part membranous and lustrous, in lower part dull and slightly wrinkled; seed ovoid, flattened, yellowish or brown. May—September.

Moderately wet and dry meadows, open forests and forest margins, often field borders and paths. — Arctic: Arc. Eur. (to 69°25'N. lat. on the Murman Coast, introduced); European part: Kar.-Lap. and Dv.-Pech. to extreme north, Lad.-Ilm., U. V., V.-Kama, Balt., U. Dnp., U. Dns., V.-Don, Bl. (rare, introduced), L. Don (rare), L. V. (N.), Crim. (mountainous part); Caucasus: all forest regions; W. Siberia: Ob (in the Ob River basin to 63°N. lat.), U. Tob., Irt., Alt. (not rising beyond 600 m above sea level); E. Siberia: Ang.-Say., Yenis. (extreme S.), Dau. (Baikal area), further eastward introduced in the vicinity of Chita, upper course of the Karenga, and to Pokrovsk; Far East: introduced in Ze.-Bu. (Blagoveshchensk), Uss. (many railroad stations, in the S. part of the region and some coastal locations); Centr. Asia: Ar.-Casp. (upper reaches of the Emba River), Balkh.
250 (Zaisan and Irtysh areas), Dzu.-Tarb., T. Sh., Pam.-Al. except desert areas, Mtn. Turkm. (Centr. and W. Kopet Dagh, introduced?). **Gen. distr.**: N., Atl., and Centr. Eur., Med., Bal.-As. Min., Iran?, Ind.-Him. (Himalayas)? Described from N. Europe. Type in London.

Note. In the USSR the species comprises two types, the Atlantic and Kopet Dagh types, respectively. The Atlantic type lives not more than 2—3 years; it is characteristic for the SW part of the distribution area in the Russian Plain, for S. Crimea and the corresponding parts of the Caucasus, i.e., territories dominated by broadleaf forests; this type is adapted to a prolonged growing period and a relatively short and warm period of winter rest. The continental type has a life-span of 3—5—7 years and even longer; it inhabits the taiga belt of the USSR and is characterized by a relatively short growing period and a long and severe period of winter rest. Both types have a large number of basal leaves. The boundary between the two types runs in the Russian Plain approximately along the E. limit of the Mid-European deciduous forest belt. The two types may be taxonomically designated as T.pratense proles atlanticum Bobr.and T.pratense proles continentale Bobr.

54. **T. expansum** W. et K. Descr. plant. rar. Hung. III (1812) 263. – T.pratense var.expansum Hausskn. in Mitth. Thür. Bot. Ver. N. F. VIII (1895) 23; Asch. et Gr. Synopsis. VI, 2, 554. – T.pratense α sativum f.expansum Gib. et Belli in Mem. d. R. Ac. Sc. Torino, ser. 2, XXXIX, (1889) 64. – T.pratense var.americanum Harz (forma culta hujus speciei) in Bot. Centralbl. XLV (1891) 106. Russian name: klever vengerskii [Hungarian]; known in cultivation as American red clover.

Perennial; stems and petioles densely covered with rather stiff and usually spreading hairs; leaflets much larger than those of T.pratense, oblong-obovate to broadly lanceolate, to 4 cm long and not more than 2 cm broad, the upper sublanceolate; stipules of median cauline leaves oblong, their free portion gradually triangular-acuminate (in T.pratense ovate or ovate-lanceolate, abruptly acuminate); flowers red. The species differs from T.borysthenicum in the color of flowers, the shape of leaflets, and characteristic indument; the Dnieper clover, however, in shape of leaves, in degree of pubescence, and partly in shape of stipules takes as it were an intermediate place between T.pratense and T.expansum.

Sometimes occurring in cultivation at experiment stations; readily escaping and hybridizing with T.pratense. Growing naturally in S. and SW Hungary, whence described, and probably here and there further south in the Balkan Peninsula. Unknown in wild state on USSR territory. Introduced into the U. S. A., where widely cultivated, possibly as a distinct 51 cultivar. In Europe, where reimported from the U. S. A., it has come to be known as American clover; until 1895 it was not recognized in Europe as a returning emigrant.

55. **T. borysthenicum** Gruner in Bull. Soc. Nat. Mosc. XLI, 2 (1869) 140; Sokolovskii in Zap. Kyyivs'k. Inst. Nar. Osv. III (1928) 197. – T.pallidum Ldb. Fl. Ross. I (1842) 543, non W. et K. – T.pratense β expansum in Schmalh., Fl. I (1895) 238. – T.pratense γ pallidum Schmalh. ibid.

Perennial; the hairs more profuse and softer as compared with T.pratense, usually patulous under the nodes and toward end of stem; leaflets elliptic, somewhat longer and narrower than those of T.pratense; stipules also narrower, hairy; flowers yellowish white or pinkish; wings scarcely exceeding keel. Differing from T.expansum in the sparser indument, in shape of leaflets, and in color of flowers.

River valleys and meadows, often solonetzic. – European part: M. Dnp. (SW), Bl., V.-Don (near Don station in Orel Region), L. Don (extreme W., while very similar forms are known in extreme E. from Krasnoarmeisk and Stalingrad [Volgograd]), Transv. (Baluika, vicinity of Ural'sk, and near Chkalov). Endemic. Described from near the village of Vesela in the Konska River valley (to the south of Zaporozh'e, in the former Aleksandrovskii County). Type in Leningrad.

Economic importance. Introduction of this species would enable southward expansion of clover cultivation.

56. **T. fontanum** Bobr. sp. n. in Addenda X, p. 291. – T.pratense var. villosum Grossh., Fl. Kavk. II (1930).

Perennial; stems covered at ends and below the nodes with appressed white hairs; leaflets of median and upper leaves ovate to lanceolate, hairy on both sides but especially beneath and at margin; heads large; flowers intensely violet-purple; standard broad, with rather large auricles, the limb about as long as the claw; corolla tube relatively broad.

Distributed through the subalpine zone of the Main Caucasus Range in wet valley meadows and spring bogs, often actually in water, at 1,500–2,500 m. Typical specimens originate from Balkariya and South Ossetia. Endemic. Type in Leningrad.

Differing from other red clover races in that the upper parts of internodes petioles, and leaflets are rather persistently and uniformly covered with white subappressed hairs; other distinguishing characters are the large, intensely colored flowers, and the shape of the standard. Ecologically, the race is notable for its distinctive habitats – wet subalpine meadows and spring bogs.

252 This race deserves serious consideration with a view to practical exploitation.

57. **T. seravschanicum** Ovcz. sp. n. in Addenda X, p. 391; nomen ex Nevski in Flora et System. IV (1937) 251. – T. pratense var. pilosius Ovcz. in sched.

Perennial, sparsely leafy, canescent; stems especially below the nodes, stipules, and leaves profusely hairy; stipules ovate, elongate-acuminate, with numerous veins; leaflets relatively small, lanceolate; heads ovoid, loose, comparatively small.

Centr. Asia: Pam.-Al. (in W. part of the Zeravshan Range in small wet meadows in the area of the Marguzarskie lakes and in the Iskander-dar'ya, Shink, and Pasrud river valleys at 1,500–2,000 m). Endemic. Type in Leningrad.

58. **T. sativum** Crome in Boennigh. Prodr. Fl. Monast. Westph. (1824) 222; Miller in Rchb. Fl. Germ. exs. II (1832) 494. – T. pratense β sativum Afzelius in Trans. Linn. Soc. Lond. I (1791) 243. – T. pratense sativum Schreb. in Sturm. Deutschl. Fl. I, IV Heft 15 (1804) 12. – T. pratense α fistulosum Schur Enum. pl. Transsilv. (1866) 154. – T. pratense α sativum Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX (1889) 60. – T. pratense A. eu-pratense b. sativum Asch. et Graebn. Synopsis VI, 2 (1908) 552. Russian names: klever krasnyi [red], kul'turnyi [cultivated].

Perennial, cultivated, closely related to wild meadow clover (T. pratense), characterized by the following features. The plants have a life-span of but 2–4 years; they are more sparsely hairy to subglabrous, and less leafy; stems 40–70 cm and even up to 1 m long, suberect or merely at base ascending, much stouter and often hollow; upper stipules broader; leaflets large, to 4 cm long; heads larger; flowers less brightly colored; calyx often reddish. May–September.

Widely cultivated in the temperate zone of the USSR except in the steppe and desert areas and high mountains, from the western frontiers to the Maritime Territory, where recently introduced; immigrant also in Sakhalin and Kamchatka. Cultivation in the W. part of the Soviet Union extends as present northward as far as 65° N. lat., but the southern limit descends in an easterly direction and in E. Siberia it is 53°N. lat. There is no doubt that cultivation of red clover can be considerably extended northward in the basins of the Severnaya Dvina, Pechora, Ob, and Yenisei rivers.

T. sativum occurs in two varieties that have long been known in agricultural practice.

A. T. sativum ssp. praecox Bobr. comb. — T. pratense praecox Witte in Landbruksv. Handl. (1918) 337, sec. Wittmack, Landwirtschaft. Samenk. 2 Aufl. (1922) 351. — Vernacular name: kudryash.

3 Biennial, rarely triennial plants, lower and less tufted, rapidly recovering after cutting and yielding two or sometimes three cuts; stems more slender, with 5 or 6 internodes. Flowering takes place in the first year and 2 or 3 weeks in advance of the late variety.

A field crop and sometimes escaped in the W. part of the USSR in areas dominated by broadleaf forests, in the Baltic States, Belorussia, and NW Ukraine, in adjoining western regions of the RSFSR, and also in climatically corresponding parts of the Caucasus.

B. T. sativum ssp. serotinum Bobr. comb. n. — P. pratense var. foliosum Brand in Bull. No. 95 Bur. of Pl. Ind. U. S. Depart. of Agr. (1906) 41. — T. pratense serotinum Witte in Landbruksv. Handl. (1918) 337 sec. Wittmack, Landwirtschaft. Samenk. 2 Aufl. (1922). Vernacular name: rostun.

Triennial or quatrennial, taller, more tufted, more leafy, late-flowering, giving little regrowth after cutting, yielding a single cut; stems stout, relatively coarse, with 7—9 internodes; flowering massively in the second year, 2—3 weeks later than the early variety; derived from the continental race of meadow clover.

A field crop and sometimes escaped in areas dominated by mixed and small-leaved forests in the taiga and forest-steppe belts, from the Baltic States to Lake Baikal; in E. Siberia and in the Far East cultivation of this clover is rare and sporadic.

Note. We do not accept the name coined by Brand (T. pratense var. foliosum), even though it enjoys priority, since it is decidedly partial and was applied only to the Orel clover, i. e., to one of the late local forms, while the name proposed by Witte may be applied to all the late clovers of the same origin. It should also be noted that the appellation serotinum more appropriately fits the nature of this clover.

59. **T. diffusum** Ehrh. Beitr. VII (1792) 165; M. B. Fl. taur. cauc. II, 210; Ldb. Fl. Ross. I, 543; Boiss. Fl. or. II, 125; Gib. et Belli in Mem. Ac. Sc. Torino, ser. 2. XXXIX, 71; Shmal'g., Fl. I, 237; Asch. et Gr. Synopsis VI, 2, 561; Grossg., Fl. Kavk. II, 282. — Ic.: W. et K. Pl. rar. Hung. t. 50; Gib. et Belli l. c. tab. III, 3. — Exs.; Fl. Hung. exs. No. 631.

Annual; stems 15—50 cm long, almost prostrate, ascending, or erect, patulous-hairy, branched, the branches finally spreading; petioles hairy, the lower longer; stipules subscarious, oblong to narrowly lanceolate, 4 filiform at summit, hairy; leaflets subsessile, obovate-lanceolate to ovate-elliptic, 1.5—2.5 cm long, denticulate, hirsute, with a light spot above; heads pseudoterminal, solitary, minutely peduncled or sessile, surrounded by terminal leaves, ovoid-globose, to 3 cm long, elongating and becoming ovoid in fruit; flowers 7—9 mm long, on very short pedicels; calyx 8—10 mm long, tubular-campanulate, hirsute, with ciliate throat; calyx-teeth triangular, 3-nerved at base, twice as long as tube, hirsute, the lowest somewhat longer than the others; corolla not exceeding the calyx-teeth, rose-purple, united into a long tube; limb of standard cuneate, rounded at apex, minutely auriculate at base; wings lanceolate, acuminate, with a rounded auricle; keel subobtuse; ovary subovoid, short-stipitate, 1- or 2-ovuled; pod scarious at base, cartilaginous at summit, 1- or 2-seeded; seeds subglobose. Fl. June; fr. July.

Scrub, woods, steppe gullies and depressions, on gritty and sandy soils. — European part: Bes., Bl., Crim. (mainly SE); Caucasus sporadically in plains and foothills of all regions, very rare in W. Transc. (Batumi—adventive?). **Gen. distr.**: SE, Eur., Bal.-As. Min. (W.). Described from Hungary.

Economic importance. This plant is perhaps of no interest for forage use because of its hairiness, but it nevertheless deserves attention on accoun of its modest soil requirements, profuse seeding, and rather ample herbage. Feeding trials should be conducted and, if these should prove successful, the plant could be widely used for undersowing in pasture in suitable areas of the southern USSR,

Section 4. **HIANTIA** Bobr. — Throat of calyx open, hairy or very rarely almost naked (eastern forms of T. lappaceum); corolla caducous, rarely persistent, yellow or pinkish (rarely purple — T. hirtum).

60. **T. apertum** Bobr. sp. nova in Addenda X, p. 291. — T. panormitanum auct Fl. Ross., non Presl. — T. squarrosum Grossh. Fl. Kavk. II (1930) 282, non L., nec M. B.

Annual; stems 20—60 cm long, erect, usually branched, appressed-hairy especially in upper part; stipules oblong, the free portion sublinear, acuminate, the margin patulous-hairy; lower leaves soon wilting; petioles appressed-hairy, the lower relatively long; leaflets on short, hairy petiolules lanceolate, 1.5—4 cm long and 0.5—1.5 cm broad, thin, diffusely appressed-
255 hairy on both sides, obscurely denticulate in upper part; peduncles appressed hairy, elongating; heads with flowers developing from below, at first narrowly conical, becoming ovoid and finally cylindric, 2—3.5 cm long and 1.5 cm broad; calyx 5—7 mm long; tube prominently 10-nerved outside, with scattered hairs, the open throat with a ring of hairs, without callosity; teeth rather narrow, subulate, not setaceous, almost stellately spreading in fruit, the lowest sometimes 3-nerved at base, exceeding the tube and nearly twice as long as the other teeth, these shorter than tube; flowers yellow, sometime suffused with pink; petal-claws united; standard spatulate, 14—15 mm long, greatly exceeding other petals; wings lanceolate, curved, acuminate; pod obovoid, scarious, with coriaceous top, 1-seeded. Fl. June; fr. July. (Plate XVI, Figure 1).

Scrub, forest margins and glades, in foothills. — Caucasus: Cisc. (western, in the north from Krasnodar to Voroshilovsk, as far east as Mineral'nye Vody), W. Transc. (N.—Anapa, Gelendzhik, Sochi). **Gen. distr.**: As. Min. (vicinity of Trebizond). Described from the vicinity of Maikop. Type in Leningrad.

Economic importance. This species is of outstanding interest for grazing, hay, and green manure, in the southern regions of the USSR.

61. **T. alexandrinum** L. Cent. pl. I (1755) 25; Amoenit. Acad. IV (1759) 286; Boiss. Fl. or. II, 127, p. p.; Gib. et Belli in Mem. Acad. Sc. Torino ser. 2, XXXIX, 148; Asch. et Gr. Synopsis VI, 2, 585; Eig. in Tr. prikl. bot., gen. i. sel., ser. VII, I (1934) 107. — Ic.: Gib. et Belli l. c. tab. VIII, 5; Hegi, Flora IV, 3, f. 1385. Russian names: klever aleksandriiskii [Alexandrian], egipetskii [Egyptian]; bersim [Berseem].

Annual, cultivated; stems 40—70 cm long, almost prostrate to erect, somewhat flexuous, hollow, sulcate, glabrous at base, moderately appressed-hairy in upper part; stipules oblong, slightly dilated at base, coriaceous, with scattered hairs, the free portion narrower, acuminate, the margin ciliate; lower leaves soon wilting, their petioles relatively long; upper leaves often subopposite, short-petioled; leaflets short-petioluled, (2) 3—5 cm long and 1—1.5 cm broad, with short appressed hairs on both sides, in upper part obscurely and unequally dentate; heads pseudoterminal, in flower 3.5 cm long and to 2 cm broad, oblong-oval in outline due to progressive wilting of the lower flowers and opening of the upper ones; peduncles appressed-hairy, elongating in fruit; calyx to 10 mm long, tubular-obconic, inconspicuously 10-nerved, rather densely subappressed-hairy outside, the throat with a ring of hairs, without callous thickening; teeth half the length of calyx, triangular-subulate, 3-nerved in lower part, patulous-hairy on the outside, glabrate at the setaceous tips, light-colored, the lowest somewhat longer than the upper pair, the lateral intermediate in length; corolla pale yellow, much longer than calyx, the claws united into a tube; standard 11—12 mm long, with a spatulate and somewhat emarginate limb, greatly exceeding the other petals; wings oblong-obovate, obtusish, with a large rounded auricle; keel almost exauriculate; pod obovoid, scarious, coriaceous in upper third, 1-seeded; seed brown; Fl. and fr. in first half of summer.

Cultivated to a limited extent for forage and green manure. — Caucasus: W. Transc. (Black Sea coast). **Gen. distr.**: Asia Minor (?), Syria, Palestine, Egypt, Cyrenaica; finding its way into cultivation in the S. part of Mediterranean Europe and in Algeria. Described from Egypt. Type in London.

Economic importance. The agricultural potentialities of this clover have not yet been sufficiently explored in the USSR. It may suffice to note that in Egypt, the classical country of its cultivation, Berseem in rotation with cotton occupies at least 50% of the cultivated area. It is suggested that thorough trials be conducted primarily in the southernmost regions of cotton cultivation, considering that the plant is decidedly thermophilic. The plant yields several cuts a year and provides excellent green manure.

62. **T. hirtum** All. Auct. ad Fl. Pedem. (1789) 20; Ldb. Fl. Ross. I, 544; Boiss. Fl. or. II, 119; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 79; Shmal'g., Fl. I, 238; Grossg., Fl. Kavk. II, 282. — T. pictum M. B. Fl. taur.-cauc. II (1803) 210, III, 507. — Ic.: Rchb. Ic. Fl. germ. XXII, 96, 1; Gib. et Belli l. c. tab. IV, 3. — Exs.: HFR No. 313.

Annual; stems (5) 10—40 cm long, erect or ascending, simple or branched, densely covered with rather long patulous or retrorse hairs; petioles hairy, the lower longer; stipules almost scarious in lower part, elongate-acuminate above, prominently few-veined, long-hairy in upper part and on the margin, the lower oblong, the upper broader, the uppermost rounded-ovate; leaflets obovate to cuneate, truncate at apex, sessile, in upper part unequally denticulate, appressed-villous on both sides; heads pseudoterminal, solitary,

subtended by terminal leaves and their broadened stipules, globose, 2–2.5 cm long, ovoid in fruit; flowers 10–12 mm long; calyx obconic, densely covered with brown hairs, the throat densely hairy; teeth longer than tube, linear-subulate, patulous-hairy, subequal; corolla purple; standard greatly exceeding the calyx-teeth, with a narrow ensiform acuminate limb; wings
257 much shorter than standard; keel about as long as wings; ovary ellipsoid, subsessile, 2-ovuled; pod scarious, commonly 1-seeded. Fl. May; fr. June.

Dry slopes of low mountains, scrub, and open woods. – European part: Crim. (S.); Caucasus: E. Transc., Tal., S. Transc. (Geryusy). **Gen. distr.**: W. and E. Med., Bal.-As. Min. Described from Piedmont.

63. **T. lappaceum** L. Sp. pl. (1753) 768; M. B. Fl. taur.-cauc. I, 213; III, 570; Ldb. Fl. Ross. I, 541; Boiss. Fl. or. II, 119; Gib. et Belli in Mem. Ac. Sc. Torino, ser. II, XXXIX, 77; Shmal'g., Fl. I, 241; Grossg., Fl. Kavk. II, 281; Fl. Tadzhik. V, 202, Plate 15. – Ic.: Sibth. et Sm. Fl. Gr. tab. 746; Gib. et Belli l. c. tab. IV, f. 5. – Exs.: Fl. exs. Austro-hung. No. 410.

Annual; stems 10–40 cm long, simple or branched, with spreading branches, glabrate or with scattered hairs; petioles hirsute, the lower longer than the upper; stipules scarious, lilac-veined, villous; leaflets subsessile, cuneate-rhombic to suborbicular and truncate, dentate in upper part, hairy beneath; peduncles initially short, later elongating; heads solitary, pseudoterminal at ends of branches, globose or ellipsoid, reminiscent of the inflorescences of avens, certain teasels, or species of Arctium; flowers subsessile; calyx tubular-obconic, in fruit campanulate, glabrous outside, with a rather dense ring of hairs in throat, or, in the extreme E. part of the distribution area, sometimes completely naked; calyx-tube 20-nerved; calyx-teeth longer than tube, dilated at base, 4- or 5-nerved, stiff, setaceous, the margin beset with spreading bristles; teeth of fruiting calyx deflexed; corolla not exceeding the calyx-teeth, pinkish, united into a tube for half its length; standard cuneate, truncate at apex, dentate; pod obovoid, scarious, 1-seeded; seeds brown. Fl. May; fr. June.

Zone of ephemeral low-mountain vegetation; sometimes a weed. – European part: Crim. (S. coast); Caucasus: Dag., W. and E. Transc., Tal.; Centr. Asia: Mtn. Turkm. (W. Kopet Dagh), Pam.-Al. (SW Tadzhikistan). **Gen. distr.**: Med. (from Canary Islands to Iran). Described from S. France. Type in the Linnaean Herbarium.

64. **T. arvense** L. Sp. pl. (1753) 769; M. B. Fl. taur.-cauc. II, 213; Ldb. Fl. Ross. I, 150; Boiss. Fl. or. II, 126; Gib. et Belli in Mem. Acad. Sc. Torino, ser. 2, XXXIX, 22; Shmal'g., Fl. I, 237; Grossg., Fl. Kavk. II, 283; Kryl., Fl. Zap. Sib. VII, 1601. – T. eriocephalum Ldb. Fl. Ross. I (1842) 541. – Ic.: Engl. Bot. XIV, 944; Rchb. Ic. Fl. Germ. XXII, 95; Gib. et Belli l. c. 1, 2. –
258 Exs.: HFR No. 109; Fl. Polon. exs. No. 159; Pl. Finl. exs. No. 762; Fl. exs. Austro-hung. No. 1605; Fl. exs. Boh.-Slov. No. 129, 235.

Annual, sometimes overwintering; stems 5–30 cm long, commonly erect, sometimes ascending, often solitary, branched, hairy; basal leaves soon wilting, with petioles the length of leaflets; cauline leaves short-petioled, adnate throughout to stipules; stipules coriaceous, the lower lanceolate and elongate-acuminate, the upper ovately dilated at base; leaflets oblong-linear, to 2 cm long and to 4 mm broad, mostly soft-hairy on both sides, obscurely veined, often unequally denticulate at summit; heads numerous, pseudoterminal, pedunculate, at first ovoid, becoming cylindric, densely

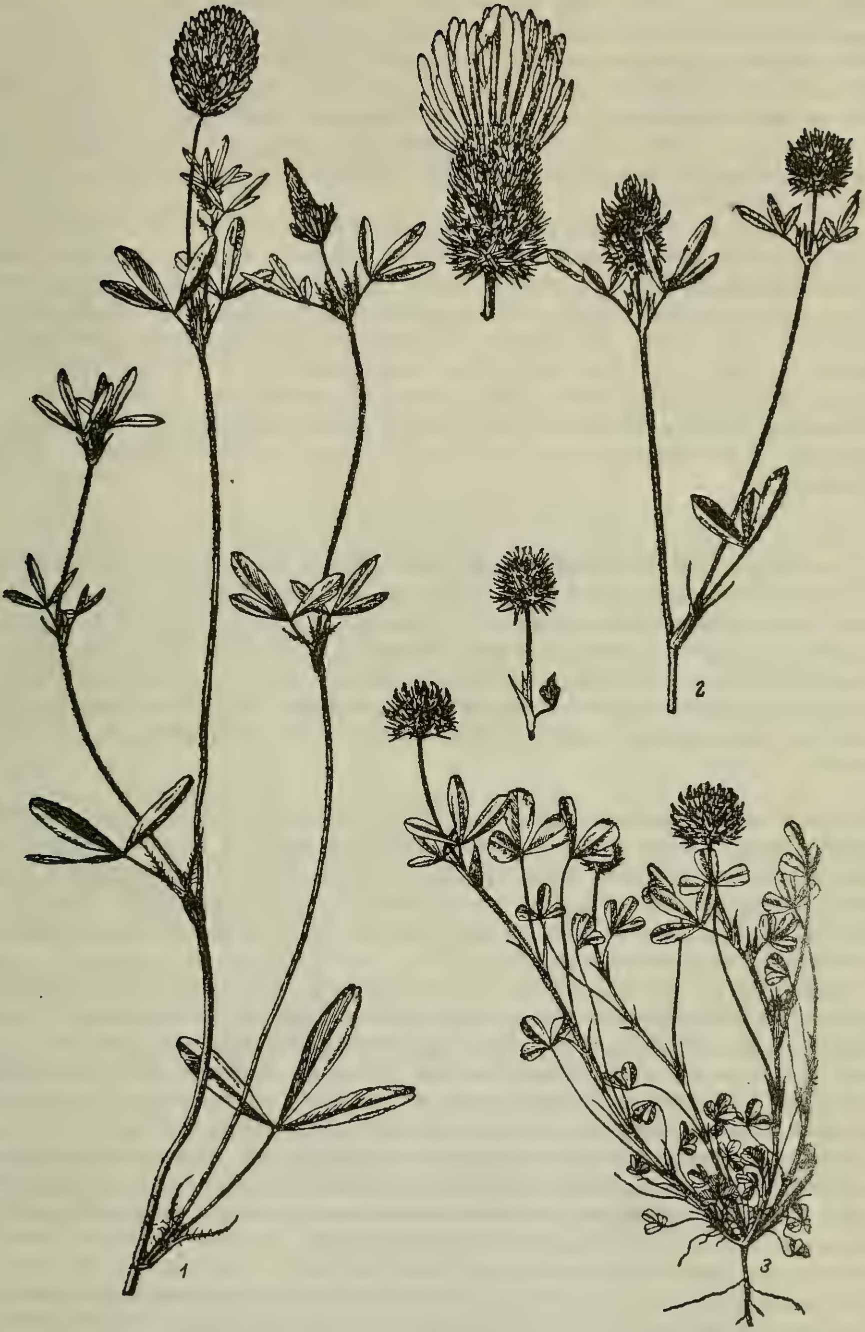

PLATE XVI. 1 – Trifolium apertum Bobr., upper part of plant and head toward end of flowering; 2 – T.maritimum L.; 3 – T.leucanthum M.B., plant aspect and fruiting head.

many-flowered, 1–2 cm long and ca. 1 cm broad; flowers sessile, ca. 6 mm long; calyx densely covered with spreading whitish barbed hairs; tube 10-nerved, subcampanulate, pale green, with few hairs at throat; calyx-teeth subulate, pinnately hairy, at least twice as long as tube; corolla much shorter than calyx-teeth, pale rose, persistent; standard almost free, lanceolate, acuminate, exceeding other petals; ovary sessile, obovoid, 2-ovuled; pod coriaceous, 1-seeded; seeds globose, yellowish green. Fl. May–June; fr. June–July.

Dry moorland meadows, plowfields, sandy loams and sands, often ruderal; in the mountains of the South ascending on gravelly slopes not higher than 1,500 m above sea level. — European part: all regions (in Kar.-Lap. only in S. part, in Dv.-Pech. only in W. part and to the Solovetskie Islands in the north); Caucasus: all regions; W. Siberia: Ob (extreme S., eastward to Tomsk), U. Tob., Irt.; Far East: Uss. (immigrant in the Pos'et area and on Russkii Island); Centr. Asia: Mtn. Turkm. (W. Kopet Dagh). **Gen. distr.:** all Europe except extreme north, W. and E. Med., N. Afr., Bal.-As. Min., Iran. (NW). Introduced into N. America. Described from Europe. Type in London.

Section 5. **CALYCOMORPHUM** Presl, Symb. bot. I (1830) 50, pro gen.; Ldb; Fl. Ross. I, 548, sect.; Čelak. in Oest. Bot. Zeitschr. XXIV (1874) 80; Gibelli et Belli in Mem. Acad. Sc. Torino, ser. 2, XLIII, 169; Asch. et Gr. Synopsis VI, 2, 595; Herm. in Fedde Repert. XXXIX, 332, 335. — Trichocephalum Koch, Synopsis (1835) 171; Boiss. Fl. or. II, 133. — Outer flowers in head fruiting, finally deflexed; inner flowers sterile, without corolla, also recurved, forming a globose head; standard united with other petals into a tube.

261 65. **T. subterraneum** L. Sp. pl. (1753) 767; M. B. Fl. taur.-cauc. II, 209; Ldb. Fl. Ross. I, 548; Boiss. Fl. or. II, 133; Gib. et Belli in Mem. Acad. Sc. Torino, ser. II, XLIII, 13; Shmal'g., Fl. I, 241; Asch. et Gr. Synopsis VI, 2, 596; Grossg., Fl. Kavk. II, 277. — Ic.: Hegi, Ill. Fl. IV, 3, p. 1283; Gib. et Belli l. c. tab. I; Rchb. Ic. Fl. germ. XXII, tab. 108. — Exs.: Fl. cauc. exs. No. 69; Fl. exs. Austro-hung. No. 1221.

Annual; stems 5–20 (40) cm long, decumbent, hairy, branched; stipules ovate, acuminate; petioles long, with scattered hairs; leaflets short-petioluled, broadly obovate, closely resembling those of wood-sorrel (Oxalis acetosella), the lower surface more hairy, the margin unequall denticulate; peduncles axillary, long, slender, deflexed, hairy; flowers few, at anthesis 2–5, minutely pediceled, ebracteolate, 10–12 mm long; calyx tubular, very narrow, ca. 5 mm long, obscurely nerved, the tube glabrous; calyx-teeth as long as tube, subfiliform, ciliate; corolla twice as long as calyx, pale pink; standard united with other petals into a long tube, with an obovate truncate limb, slightly exceeding wings; flowers deflexed after anthesis and appressed to peduncle; sterile flowers much more numerous, developing after anthesis from a globose bud 1–1.5 cm broad and consisting of calyx with stellate-spreading lobed teeth, also becoming deflexed and surrounding the fruits; heads reflexed after anthesis and appressed to ground, finally buried in the soil; pod coriaceous, exserted, 1-seeded. Fl. April–May; fr. May–June.

Low-grass meadows and scrub, especially on light soil. — European part: Bl. (according to Schmalhausen, in the coastal strip of the former Dnieper County), Crim. (S. coast); Caucasus: Cisc. (Temryuk), Dag. (Makhach-Kala, Derbent), W. Transc. (from Sochi to Batumi in coastal districts, Kutaisi), E. Transc. (E.), Tal. **Gen. distr.**: W. and E. Med., Bal.-As. Min., Iran. (Gilan). Described from S. France. Type in London.

Economic importance. Widely cultivated as a pasture plant in Australia and New Zealand.

Tribe 5. LOTEAE Benth. in Benth. et Hook. f. Gen. I (1865) 442. — Stamens united, monadelphous or diadelphous, all filaments or only 5 dilated at top. Herbs, undershrubs, or shrubs.

Genus 793. **ANTHYLLIS** * L.**

L. Gen. pl. ed. 5 (1754) 321.

Flowers in capitate inflorescences subtended by involucral bracts; calyx tubular, after anthesis (in our species) inflated; calyx-teeth subequal or unequal; petals long-clawed, the 4 lower adnate to staminal tube; standard often auriculate at base; wings ovate, obtuse; keel incurved, obtuse or acutish, shorter than wings; stamens mostly diadelphous, the filaments thickened at the top; ovary mostly stipitate, in our species 2-ovuled; style glabrous; pod ovoid (in our species), indehiscent, included in the calyx; seed mostly 1. Herbs (ours) or undershrubs, sometimes shrubs; leaves imparipinnate, sometimes reduced to terminal leaflet; stipules small or none.

Note. An essentially Mediterranean genus. In the USSR it is represented solely by species of the most widespread subgenus Vulneraria DC., Prodr. II (1825) 169, which is recognized by some authorities as a separate genus. All the species occurring in the USSR belong to the composite genus A. vulneraria L., which constitutes a very complex and heterogeneous form-cycle. Although much work was devoted to this cycle by a number of workers,† it is still insufficiently sorted out. In Central Europe and, more particularly, in Mediterranean countries, this cycle manifests itself in complexes of different forms; in the USSR it reaches the eastern limit of its distribution range, and it is represented here by what are merely the ultimate links of various "series." In trying to work out the systematics of this group, one encounters great difficulties because of scarcity of distinguishing characters between the species (these being mostly recent and insufficiently differentiated races) and the occurrence of numerous intermediate or "transitional" forms. Moreover, delimitation of the "series" mentioned above involves almost insuperable difficulties because of the large number of what appear to be hybrid forms, which constitute a link between species that are sometimes of different origin. It should be noted that W. Becker, in his later studies, refrained altogether from subdivision of the group into "series" of component species. In his first, fundamental study he distinguished two series, as opposed to Sagorski who subdivided the group into a much greater number of series. In the present 263 treatment we adopt Becker's approach. As for intermediate and stray forms we have made an attempt to account for all instances known to us in notes to individual species and, somewhat conditionally, we have set up two of these forms as independent species and have included them in the key.

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* A plant name occurring in the writings of Dioscorides.

** Treatment by S. V. Yuzepchuk.

† Notably: E. Sagorski, Ueber den Formenkreis der Anthyllis Vulneraria L., Deutsche Bot. Monatsschr., 1890 pp. 129—140 and Allgem. bot. Zeitschr. Bd. XIV, 1908—XVII, 1911; W. Becker. Bearbeitung der Anthyllis-Section Vulneraria DC. Beih. Bot. Zentralbl., II Abt., Bd. XXVII, 1910, pp. 156—287; id. Anthyllis-Studien, ibid Bd. XXIX, 1912, pp. 16—40.

As regards escapes of cultivated forms of kidney-vetch (see paragraph on economic importance) that are sometimes collected in the USSR, it may be noted that they are mostly distinguished without difficulty from the wild-growing forms. The cultivated forms have as yet been studied very little from the taxonomic point of view and they are not discussed in the present treatment.

Economic importance. All our species of Anthyllis are high-value forage plants. They are readily eaten by livestock, more particularly by sheep and goats. A. Dmitriev, in his renowned work "Pastbishcha romanovskoi ovtsy" [Pastures of the Romanov Sheep] (SPb, 1902), places "A. vulneraria L." (A. polyphylla Kit.) among the most characteristic meadow plants of the Volga region (p. 27) and believes it to be one of the pasture plants that account for the outstanding quality of the Romanov sheep (p. 71); he considers this plant as an essential component of pastures specially designated for sheep (p. 82). Kidney-vetch was introduced into cultivation as late as the second half of last century, at first in Germany. It is now quite often cultivated in W. Europe, especially for grazing; it does not need fertilizing and it persists for a long time by self-seeding. The plant has on the whole very modest requirements, but it yields only a single cut and in this respect it is greatly inferior to clover. The yield ranges from 40 to 200 centners* per hectare. Kidney-vetch is rather rarely cultivated in the USSR and then mostly in mixture with other legumes. Kidney-vetch hay has the following percent composition: dry matter 86, protein 8.6, fat 2.7—3.2, crude cellulose 26.7—32.9, nitrogen-free extract 37.2—40.4, nitrogen 2.1—2.3, ash 6.0—7.8; the ash contains in percentages: 4.4—9.2 phosphoric acid, 12.3—25.4 potassium, 25—34 calcium, and 2.2—3.0 magnesium (Stebler).

The plant also contains pigments and tanning agents. In earlier times it was widely employed in popular medicine as astringent and for wound dressing.

1. Mostly lowland plants; leaves usually evenly distributed along the stem 2
+ Mountain (Carpathian) species; leaves 1—3, usually confined to lower part of the stem 14
2. Leaves glabrous above 3
+ Leaves, or at least the upper, more or less pubescent 11

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* [Metric centner = 100 kg.]

3. Indument of stems and petioles composed entirely of appressed hairs . . . . 3.

+ Stems in lower part and petioles of basal leaves with more or less patent hairs (this character is sometimes inconspicuous, patent to subpatulous hairs being confined to base of stem and petioles of basal leaves) . . . . 10.

4. Calyx usually colored at apex . . . . 5.

+ Calyx pale . . . . 8.

5. Rather tall plants; stems erect from a short arched-upcurved base; flower-heads 1 to several; flowers mostly yellow. – Forms of A. arenaria (Rupr.) Juz. with calyx colored at apex . . . . 9.

+ Shorter plants; stems mostly ascending or prostrate; flower-head solitary . . . . 6.

6. Bract-lobes obtusish; flowers dark sanguine . . . . 2. **A. coccinea** (L.) Beck.

+ Bract-lobes more or less acute; color of flowers not as above . . . . 7.

7. Flowers in our forms usually yellow, rarely reddish. Plants of the Baltic States . . . . 1. **A. linnaei** Sag.

+ Flowers lurid, becoming purple after anthesis and finally bright red. Crimean mountain plants . . . . 3. **A. biebersteiniana** (Taliev) Popl.

8. Stems long, firm, leafy; cauline leaves with numerous pairs of lateral leaflets; heads large, many-flowered, compact; bracts exceeding calyx, deeply divided; calyx long, with long patent hairs . . . . 8. **A. schiewereckii** (DC.) Blocki.

+ Plants differing in at least some of the characters . . . . 9.

9. Calyx covered with rather short appressed or subpatulous hairs. Boreal plant . . . . 5. **A. arenaria** (Rupr.) Juz.

+ Calyx covered with rather long, mostly distinctly patent hairs. Crimean plant . . . . 6. **A. taurica** Juz.

10. Calyx concolorous, pale; mostly large plants, with more or less erect stems and usually large flowers (c.f. X polyphylloides Juz.) . . . . 7. **A. polyphylla** Kit.

+ Calyx dark red at apex; smaller plants, often with procumbent stems and smaller flowers; semipatent indument confined to stem base or petioles . . . . 9. **A. colorata** (Meinsh.) Juz.

11. Stems robust, erect, patulous-hairy in lower part; bracts deeply divided, mostly exceeding calyx; heads large, many-flowered; calyx long, not colored at apex, with long spreading hairs. Forms of A. polyphylla Kit. with leaves pubescent on the upper surface; c.f. preceding stage . . . . 10.

+ Plants differing in above characters . . . . 12.

12. Leaves sparsely covered above with appressed silky hairs. Plants of sand dunes . . . . 4. **A. maritima** Schweigg.

+ Leaves finely arachnoid above, often with patulous or subpatulous hairs. Caucasian mountain plants . . . . 13.

13. Stems slender, with a solitary head; calyx more or less purple-tinged in upper part. Alpine plants . . . . 10. **A. caucasica** (Grossh.) Juz.

+ Stems rather stout, with 1 to several heads; calyx mostly pale. Mostly subalpine plants . . . . 11. **A. lachnophora** Juz.

14. Dwarf alpine plants; calyx smoky-gray or greenish gray, 12—17 mm long . . . . 12. **A. alpestris** Rchb. em.
+ Mostly taller plants; calyx yellowish white, 9—11 (12) mm long . . . . 13. **A. affinis** Britt.

1. **A. linnaei** Sag. in Allgem. Bot. Zeitschr. (1908) 129. — A. vulneraria L. Fl. suec. ed. II (1755) 249 (excl. syn. plur. et var. γ coccinea) et auct. mult. praesert. Fl. Scandin.; L. Sp. pl. (1753) 1012 p. p.; Ldb. Fl. Ross. I, 522 p. p. — A. monocephalos Sag. l. c., vix autem Gilib. Fl. Lithuan. IV (1798) 97. — A. vulneraria * euvulneraria Lindl. fil. Schedae op. quod inscrib. Pl. Finl. exsicc. fasc. IX—XX (1916) 93. — A. vulneraria var. kerneri Sag. in D. B. Monatsschr. VIII (1890) 136, p. p. — Vulneraria rustica f. calcarea Rupr. Fl. ingr. I (1860) 251—252, saltem p. p. — Exs.: Pl. Finl. exsicc. No. 756.

Annual to biennial or perennial; stems 1—10 (12), arcuately suberect or procumbent, (2) 40—30 [?] cm long, slender, rather densely covered throughout with short appressed hairs, pale green or slightly suffused with red, simple or occasionally with short leafless branches from the upper leaf axils, these branches bearing a single often abortive head; basal leaves simple or imparipinnate, the petioles appressed-hairy; leaflets glabrous above and sparsely appressed-hairy beneath, the lateral 1—3 pairs, mostly rudimentary, the terminal large, elliptic; cauline leaves (1) 2 or 3 (4), more or less uniformly spaced along the stem, leaflets glabrous or sporadically hairy above, rather densely appressed-hairy beneath, subappressed-hairy on the margin, the lateral 1—4 pairs, elongate or linear-lanceolate, the terminal leaflet in lower leaves much longer and broader, in upper leaves about
266 equaling the lateral; heads on main stem solitary, subsessile to rather long-peduncled, 1.5—3 cm in diameter, mostly rather loosely few-flowered; bracts equaling or shorter than calyx, very rarely longer, commonly divided to the middle, inconspicuously veined, the lobes rather broad and acutish; calyx 6—9 mm long and 2.5—4 mm broad, bicolor, pale in lower part, dark purple-tinged in the upper, densely covered with shortish loosely appressed hairs; corolla variously colored: red (var. rubra L.), white (var. alba L.), or yellow (var. lutea L.), with various intermediate and mixed colors occurring; limb of standard ca. 6 mm long and 4 mm broad, the claw 6 mm long. June—July.

Maritime meadows and scrub, forest margins, exposed dry grassy places, wastes, fields, stony and rocky bluffs and slopes, mainly on calcareous soil. — European part: Balt. (especially Estonian SSR). **Gen. distr.:** Scand., Centr. Eur. Described from Sweden. Type unknown (type A. vulneraria L. Fl. suec. — in London).

Note. This species is primarily associated with the coast and islands of the Baltic Sea. It corresponds to A. vulneraria in the narrowest sense; we prefer, however, the name coined by Sagorski, considering the much more indeterminate meaning that the Linnaean name has acquired in the studies of many authorities.

2. **A. coccinea** (L.) Beck in Ann. K. K. Naturhist. Hofmus. XI (1896) 65; Sag. in Allg. Bot. Zeitschr. (1909) 9. — A. vulneraria γ coccinea L. Fl. suec. ed. II (1755) 250. — A. vulneraria subsp. coccinea W. Becker in Beih. Bot. Centralbl. Bd. XXVII, 2 (1910) 268. — Exs.: Fries Herb. norm. fasc. XIV, No. 57.

Annual to perennial; stems 2, suberect, mostly not more than 15 cm long, appressed-hairy; basal leaves with a relatively large terminal leaflet or often subequifoliolate; cauline leaves 1 or 2, very often confined to the lower part of the stem or rather evenly spaced, equifoliolate; all leaflets glabrous or subglabrous above, densely appressed-hairy beneath; bracts usually equaling or somewhat shorter than petiole, with subobtuse or rarely acutish lobes; heads solitary or rarely twin, 1–2.5 cm in diameter; calyx dark red at apex, 8–9 mm long, with semipatent to patent hairs; corolla sanguine; in other characters resembling A. linnaei Sag. June–July.

Dry stony places and pastures. – European part: Balt. (Saare Island, etc.). **Gen. distr.:** Scand. (the islands of Oland, Gottland, and Sylt; also reported for Oslo in Norway); related form in Scotland and England (A. dillenii Schult. s. str.). Described from Oland. Type probably in London.

Note. A form restricted entirely or almost entirely to Baltic Islands. As these islands are also the home of A. linnaei Sag., field observations are needed to determine how far the two species are definitely differentiated. The main difference between them consists in flower color; other distinguishing features of A. coccinea such as lower growth, different disposition of cauline leaves, and the obtusish bract-lobes, are apparently not of absolute significance. For the time being, in conformity with Sagorski, we consider A. coccinea as a distinct species. Sagorski considered this species to be an ancient relict type from which A. linnaei Sag. is derived (to other forms of A. vulneraria, in the more restricted sense of A. Kerner and W. Becker, he ascribed a different origin).

3. **A. biebersteiniana** (Taliev) Popl., Spis. rast. Krymsk. zapovedn. (1932) 55. – A. vulneraria var. biebersteiniana Taliev in Trav. de la Soc. d. nat. Univ. Kharkov XLII (1909) 191. – A. pulchella W. Becker in Beih. Bot. Centralbl. XXIX, 2 (1912) 31, nec Vis. Fl. dalm. suppl. I (1872) 141. – A. vulneraria M. B. Fl. taur.-cauc. III (1819) 460 et auct. plur. fl. Taur. saltem p.p. – A. vulneraria 1 et 6, Ldb. Fl. Ross. I, 522.

Biennial or perennial; stems (1) 4–9 (11), arcuately suberect, prostrate at base, 5–20 (30) cm long, rather slender, often flexuous, rather densely covered (most densely toward the ends) with short closely appressed silvery hairs, mostly becoming dingy purple, unbranched or, in upper part of vigorous specimens, with weak slender elongated and mostly leafless branchlets, these bearing an abortive or greatly reduced head; basal leaves numerous, densely sheathing the base of flowering stems, often together with remnants of preceding year's stems and leaves; the upper surface of leaflets glabrous, the lower surface and petioles rather densely appressed-hairy; lateral leaflets 2 pairs, the upper elliptic to narrowly elliptic, tapering at base to a very short petiolule, acutish at apex; terminal leaflets, slightly or mostly much larger than the lateral, broad-elliptic to elliptic, rounded at apex or terminating in a short dark purple point; cauline leaves 2 or 3, evenly distributed along the stem or rarely confined to lower part of stem; lateral leaflets 2–4 (5) pairs, narrowly elliptic to lanceolate, tapering at both ends; the terminal slightly longer and broader, in uppermost leaf resembling the lateral in size and shape; indument similar to that of basal leaves but the rather long hairs somewhat loosely appressed beneath and antrorse-patulous on the margin; heads at the end of the main stem, solitary or rather rarely 2 and then close together, long-peduncled, 1.5–2.5 (3) cm in diameter, with a moderate number of flowers, rather loose to fairly compact; bracts equaling the calyces or longer and then mostly exceeded by the corollas, divided for half to two thirds of their length, the veins distinct and in dry plants somewha prominent, the subacute or acute lobes rather densely covered with indument resembling that of cauline leaves; calyx 8 mm long, (2) 3–4.5 mm broad, densely clothed with rather long loosely appressed to subpatent hairs, dark purple at apex; corolla lurid, becoming purple and at wilting bright red. June–July.

Stony places, mountain steppes and meadows. – European part: Crim. (Yaila). Endemic. Described from the Crimea. Type in Kharkov.

Note. A very interesting endemic form of the Crimea, associated with the Crimean Yaila and closely related to A.pulchella Vis. of the Bal.-As. Min. region and with which it was actually identified by W. Becker and later by E.V. Wulf. The Crimean plant differs from the true A.pulchella Vis. chiefly in the following characters. The plant as a whole is larger, with less hairy leaves; leaflets usually glabrous above and less hairy beneath, the hairs loosely appressed and on the margin mostly semipatent; bracts longer than those of A.pulchella, equaling the calyces or the whole head and sometimes exceeding it; heads larger; indument of calyx consisting of longer and more spreading hairs; corolla more whitish (not yellow). In respect of the size of its parts and certain other characters, A.biebersteiniana approaches more closely the form known as A.pulchella var. (β) monticola Sag., l. c. (1908) 188, than the typical A.pulchella; some other features, however, preclude its identification with that form. But then the material relating to A.pulchella Vis. at our disposal cannot be regarded as sufficient and a final decision concerning the differentiation of the two forms must be postponed. It is noteworthy that A.pulchella Vis. (considered by Sagorski as an ancient Tertiary species) is genuinely alpine, and this lends support to inclusion of A.biebersteiniana among the alpine elements of the flora of the Crimean Yaila.

4. **A.maritima** Schweigg. in Hagen, Chloris Boruss. (1819) 265; Sag. in A. B. Zeitschr. (1908) 42. – A.vulneraria β maritima Koch, Synops. ed. III (1857) 137; Sag. in D. B. Monatsschr. VIII (1890) 136. – A.vulnerari ssp. maritima W. Becker in Beih. Bot. Centralbl. XXVII (1910) 268. – 269 A.vulneraria 4, Ldb. Fl. Ross. I (1842) 522. – A.polyphylla var. maritima Nym. sec. Hegi, Ill. Fl. Mitt.-Eur. IV, 3 (1924) 1360. – Ic.: Rchb. Pl. crit. II, 285; Hegi, l. c. IV, 3 f. 1429, 4. – Exs.: Rchb. Fl. Germ. No. 272.

Biennial to perennial; stems (1) 2–6, procumbent or ascending, 20–40 and more cm long, rather stout, often curved, simple or mostly branched from base, densely covered with closely appressed silky white hairs, the more densely hairy upper part of stem markedly sericeous; basal leaves pinnate, mostly with 2 pairs of lateral leaflets, these often reduced, the broadly elliptic terminal leaflets usually twice to three times as long and broad; cauline leaves 3 or 4, evenly distributed along the stem, with 2–4 pairs of narrowly lanceolate to sublinear lateral leaflets; terminal leaflet of lower leaves oblong-lanceolate to lanceolate and not more than twice as long and broad as the lateral, that of upper leaves narrowly lanceolate to sometimes sublinear and often about equaling the lateral; all leaflets somewhat silky beneath with rather long appressed hairs, only those of basal leaves often glabrous above; heads 2–7, the lateral on rather long leafless or 1-leaved axillary branches, sometimes abortive, the terminal solitary on a mostly long peduncle, sometimes 2–4 and then somewhat scattered, 2.5–3.5 cm in diameter, rather many-flowered and compact; bracts mostly equaling or scarcely exceeding calyces, divided to half to two thirds of their length into rather narrow pointed lobes; calyx 8–10 mm long and 3–5 mm broad, very densely covered with loosely appressed or semipatent long pale yellowish hairs; corolla golden yellow to almost orange, the keel sometimes red-tipped; limb of standard ca. 6 mm long and 4 mm broad, the claw 6 mm long. June–July (August).

Dunes and maritime sands.— European part: Balt. (Latvian SSR). **Gen. distr.**: Centr. Eur. (N. Germany, Belgium). Described from Prussia. Type probably in Berlin.

Note. A very characteristic plant, apparently closely linked genetically with the next species (sometimes, however, closely approaching A. polyphylla Kit.). A form from the Latvian SSR (shore of Gulf of Riga), that we have provisionally designated as A. baltica Juz. in sched., differs from A. maritima in lower growth and smaller size of various plant parts, but more particularly in the dark red apex of the patulous-hairy calyx. In habit, indument, and growing conditions, this form resembles closely A. maritima. It could easily be considered a hybrid A. linnaei × A. maritima, except for the fact that A. linnaei does not occur in places occupied by A. baltica. The standing of the latter can only be ascertained by further observations in situ.

5. **A. arenaria** (Rupr.) Juz. comb. nov. - Vulneraria rustica f. arenaria Rupr. Fl. Ingr. vol. 1 (1860) 252.— Anthyllis sp. Rupr. in Bull. de la Cl. Phys. -Mat. Ac. Sc. -Pétersb. XII (1854) 215, 222, 223.— A. vulneraria Ldb. Fl. Ross. I, 522 p.p.— A. vulneraria * affinis Lindb. fil. in Med-del. af Soc. pro F. et Fl. Fenn. 41 (1915) 41; id. Schedae oper. quod inscrib. Pl. Finl. exsicc. fasc. IX–XX (1916) 93, No. 757, non A. affinis Britt.— Exs.: Pl. Finl. exs. No. 757 (non typic.).

Biennial to perennial; stems (1) 3–10 (16), erect from suberect or upcurved base, 14–45 cm long, rather slender but firm, simple or very often branched from the middle; branches strongly elongated, arising at a very acute angle and often almost appressed to stem, leafless or bearing 1 leaf, covered throughout with rather short closely appressed hairs, often becoming red; basal leaves with 1–4 pairs of very small or sometimes well developed lateral leaflets, the rather large elliptic terminal leaflet usually attenuate at base, mucronate at apex; cauline leaves 2–4, fairly evenly distributed along the stem or usually none on the upper third or even half of the stem; lateral leaflets 2–4 pairs, in lower leaves oblong, in upper linear-lanceolate, acuminate or in the lowest leaves obtusish; terminal leaflet much larger, narrowly elliptic, cuneate at base, mucronate at apex; uppermost leaf equifoliolate; all leaflets glabrous above, covered beneath with rather short subappressed or appressed hairs; hairs on main stem 1–4 (5), the lower very remote, 2–3 cm in diameter, rather few-flowered and loose; bracts equaling or slightly shorter than calyces, rarely (mainly in lower heads) longer or even exceeding the flowers, divided mostly to the middle, rarely to one third or two thirds of their length (the latter usually in lower heads only), the obtusish to subacute lobes with indument resembling that of cauline leaves; calyx 7–10 mm long and 3–4 mm broad, moderately

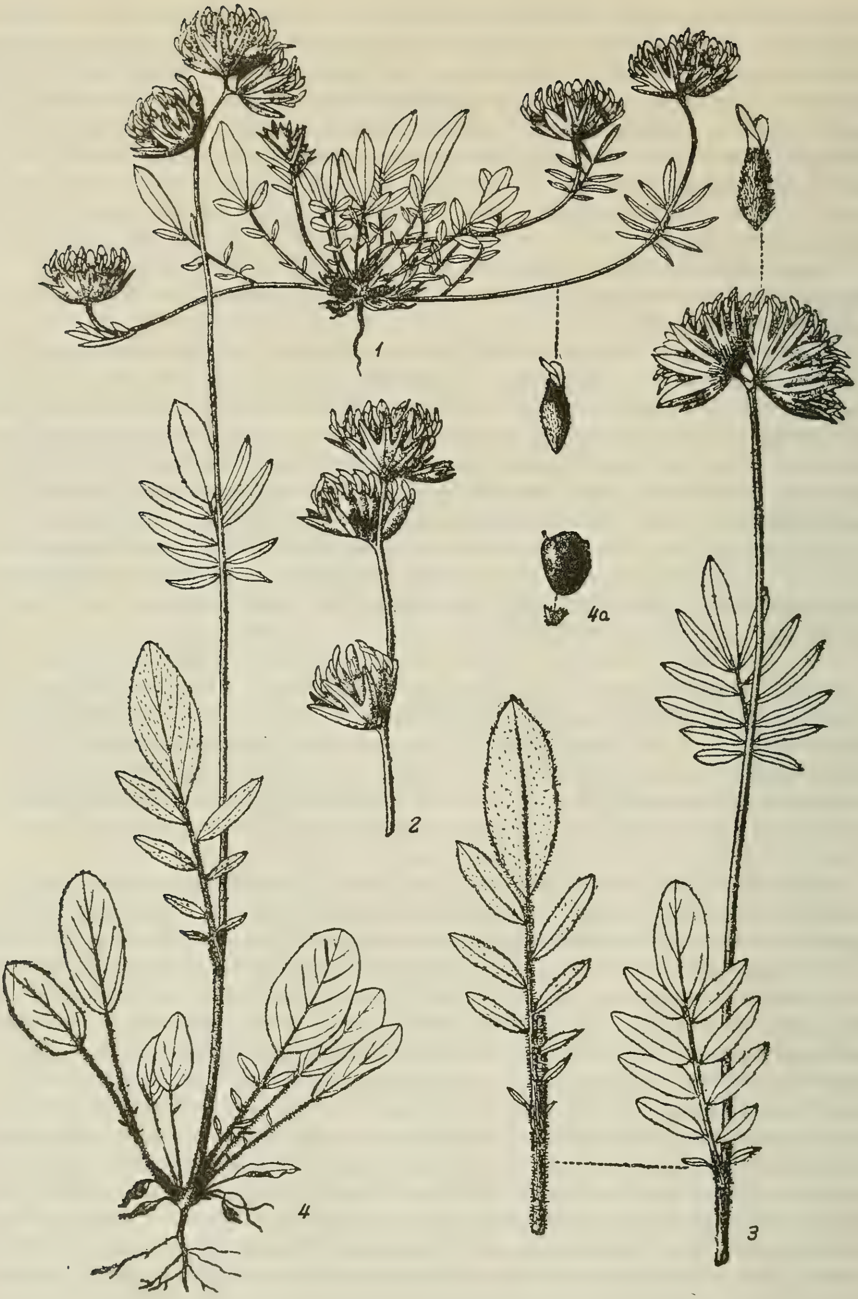

PLATE XVII. 1 — Anthyllis biebersteiniana (Taliev) Popl., habit, flower; 2 — A. arenaria (Rupr.) Juz., end of stem with inflorescences; 3 — A. polyphylla Kit., end of stem, cauline leaves, flower; 4 — A. lachnophora Juz., habit; 4a — fruit.

covered with long, loosely appressed or semipatent hairs, concolorous (forms with colored apex very rare); corolla pale yellow, small; keel often red-tipped; limb of standard ca. 6 mm and 5 mm broad, the claw 6 mm long. June–August. (Plate XVII, Figure 2).

Pine woods and moors, dry sandy meadows (especially high-altitude alluvial meadows); sandy and stony, sometimes rocky shores of rivers and lakes, and waterside rock wastes, roadsides, fallows, and derelict plowfields. – European part: Balt., Lad.-Ilm., Kar.-Lap., Dv.-Pech. **Gen. distr.**: Scand. (Finland), Centr. Eur.? Described from the vicinity of Luga. Type in Leningrad.

Note. We considered it necessary to set up this rather characteristic plant, which apparently constitutes an element of the so-called Sarmatian flora, as a distinct species; in doing so we adopt Ruprecht's varietal epithet. The plant does not appear to coincide with any of the species of this section that have so far been established. A plant from S. Finland, apparently very closely approaching typical A. arenaria, was referred at one time by H. Lindberg to A. affinis Britt. It is also likely that it was A. arenaria that Sagorski had in mind when he wrote about A. affinis as spreading "bis tief in Russland hinein" (Sagorski, 1908, p. 124). However, A. affinis differs markedly in its habit from the plant here described, being usually somewhat lower and being characterized by a smaller number of heads; its leaves are more evenly distributed along the stem; the heads are larger; the bract-lobes are more obtuse, often almost rounded at apex; the calyx is more inflated and relatively shorter. Besides A. affinis, our species calls also for comparison with A. vulgaris (Koch) Kern. In the latter, as opposed to A. arenaria, the calyx is covered with rather short closely appressed hairs, the stem is stouter, the cauline leaves are fewer and their distribution along the stem is markedly uneven, while the golden-yellow corolla is larger.

Finally, as regards the plant of Mazarakii and Baranov (Herb. Fl. Ross. No. 208), not typical A. arenaria but, to judge by specimens bearing this number in herbaria accessible to us, representing a form that seems to be intermediate between A. arenaria and A. polyphylla (see below × A. polyphylloides Juz.), it was designated by Sagorski as A. pseudovulneraria Sag. (Cfr. W. Becker 1912, p. 31). This species was undoubtedly based by Sagorski on extremely heterogeneous material derived from various locations. A character indicated by Sagorski as common to all forms referred here and distinguishing them from A. linnaei Sag. is "viel lebhaftere Färbung der Blumenkrone sowohl wie des Kelches" (Sagorski, 1908, p. 130), a feature characteristic neither of A. arenaria (if we disregard the plants from Dv.-Pech. which we have referred here) nor of the intermediate form mentioned. Concerning differences between A. arenaria and A. linnaei Sag., two species that are hardly allied in spite of the contiguity of their distribution ranges, A. arenaria is distinguishable by its greater dimensions and vigor, more erect stems, less even distribution of cauline leaves, with often more than one head on the main stem (irrespective of heads on lateral branches), and calyx concolorous as a rule.

6. **A. taurica** Juz. sp. nova in Addenda X, p. 392. – A. tricolor W. Becker in Beih. Bot. Centralbl. XXIX, 2 (1912) 31, non Vuk. Rad. jugosl. Acad. XXXIV (1876) 5. – A. vulneraria auct. mult. Fl. taur. saltem p. p.

Biennial to perennial; stems 2–10, erect from arcuate base, 15–30 (40) cm long, rather slender, erect or slightly pale, rather densely covered throughout with shortish closely appressed hairs; flexuous, simple or branched, branches semipatent, slender, leafless, disposed in upper part of the plant; basal leaves few, occasionally simple, mostly with (1) 2–4 pairs of lateral leaflets, the terminal leaflet elliptic, relatively small though larger than the lateral; cauline leaves (2) 3 or 4, evenly distributed along the stem; lateral leaflets (3) 4–6 pairs, lanceolate to linear-lanceolate or sometimes sublinear; terminal leaflet equaling or somewhat larger than the lateral; all leaflets glabrous above, covered beneath with rather long loosely appressed to mostly subpatulous hairs, and on the margin semipatent to almost patent-hairy; heads at the end of stem solitary or up to 3 and then rather remote on a fairly long common peduncle, 2–3 cm in diameter, rather loosely few-flowered; bracts equaling or scarcely exceeding the calyces, divided to the middle or slightly deeper, with subacute lobes, the indument resembling that of cauline leaves; calyx 6–9 mm long and 2.5–4.5 mm broad, densely patent-villous, concolorous; corolla pale yellow; keel red-tipped; limb of standard ca. 5 mm long and 4 mm broad, the claw 6 mm long. May–June.

Rocky places, rarely beech woods and forest glades. — European part: Crim. Endemic. Described from the Crimea. Type in Leningrad.

Note. This species is little known. It is not linked phylogenetically with 275 A.biebersteiniana (Tal.) Popl., a species more common in the Crimea. The plant in question was collected by S. S. Stankov during an ascent of Mt. Syuyur-kai. While retaining the typical aspect of A.taurica (though with somewhat colored calyx-teeth), it is characterized by more or less patent indument of the lower part of stem and of petioles, especially those of basal leaves. The position of this form is not yet clear: it may possibly be a hybrid with participation of A.polyphylla Kit. Most probably W. Becker was dealing with a similar form when he reported for the Crimea the species A.spruneri Boiss., which certainly does not occur in the USSR.

7. **A. polyphylla** Kit. sec. Bess. ex Ser. in DC. Prodr. II (1825) 170 in syn.; Kern. in Oesterr. Bot. Zeitschr. XVIII (1868) 384; Kern. Schedae ad Fl. exsicc. austro-hung. II (1882) 14 No. 431; Sag. in Allg. Bot. Zeitschr. XIV (1908) 125; W. Becker in Beih. Bot. Centralbl. XXVII, 2 (1910) 261. — A.vulneraria ξ polyphylla Ser. in DC. l. c.; Sag. in D. B. Monatschr. VIII (1890) 139. — A.vulneraria Sadl. Fl. comit. Pest. II (1826) 178 et auct. mult, non L. — A.vulneraria 3, Ldb. Fl. Ross. I (1842) 522 p. p. — A.vulneraria I A.vulgaris Rasse polyphylla Asch. et Gr. Syn. VI, 2 (1908) 624. — A.schiwereckii Blocki in Oesterr. Bot. Zeitschr. (1912) 397 p. p., non A.vulneraria η schiwereckii Ser. in DC. l. c. nec Sag. in Allg. Bot. Zeitschr. (1908) 126. — A.polyphylla var. ciscaucasica Grossh. Fl. Kavk. II (1930) 286. — Exs.: Fl. exs. Austro-hung. No. 431; Fl. Hung. exs. No. 685.

Biennial to perennial; stems 1–6, erect, (15) 25–50 (60) cm long, stout and robust, erect, often branched in upper part, usually green (not colored), in all or part of the lower half shaggy with horizontally spreading rather long stiffish hairs, in upper part appressed-hairy; basal leaves with (0) 1 or 2 (4) pairs of small lateral leaflets, the terminal leaflets mostly very large, ovate or elliptic, rounded at apex or mucronulate; cauline leaves (2) 3–6 (7), uniformly distributed along the stem or occasionally confined to the lower

two thirds, with (4) 5 or 6 (7) pairs of lateral leaflets, these ovate or elliptic in lower leaves, linear-lanceolate in the upper; terminal leaflet of lower leaves obtuse, much larger than the lateral, that of upper leaves subacute or acute and resembling the lateral in size and shape; uppermost leaf often with leaflets so closely approximate that it is apparently digitate; all leaflets glabrous or with few stiffish hairs above, rather densely shaggy beneath with rather long stiffish loosely appressed or mostly subpatulous hairs; petioles semipatent-hairy; heads solitary or mostly 2–4 on the stem,
6 subapproximate, 3–5 cm in diameter, very many-flowered, dense and compact; bracts mostly equaling the calyces or even the whole head or, in the case of lower heads, often much longer, divided to lower one quarter to one third, those of lower heads sometimes down to base, mostly acutish at apex; calyx 12 mm long and 3–5 mm broad, little inflated in fruit, concolorous; densely shaggy with long subpatent hairs; corolla commonly yellow, often with reddish-tipped keel, rarely reddish throughout; limb of standard ca. 6 mm long and 5 mm broad, the claw 6–7 mm long. June–August.

Steppes, steppe slopes and gullies, dry meadows, and riverine alluvia (especially riverbed ridges), exposed dry grassy places, slopes, knolls, hills, pine woods, clearings and forest margins, groves, scrub, moors, fields, and pastures, on chernozem, sandy, clayey, and calcareous soils, sometimes on chalk.— European part: Balt. (Estonian SSR, Lithuanian SSR); Lad.-Ilm., U. Dnp, Dv.-Pech., M. Dnp., U. V., V.-Don, Bl., Crim., U. Dns., Bes.; Caucasus: Cisc., Dag. **Gen. distr.**: Centr. Eur. Described from Hungary. Type in Budapest.

Note. Apparently an element of Pannonian flora which, however, penetrates a long way northward and eastward. It should be noted that in specimens collected in the northern parts of the distribution range various characters of this plant (such as large stature, leafiness, and stiff patent indument of lower plant parts) are usually much less in evidence. We refrain, however, from establishing any kind of northern race since we have also seen analogical examples of less typical forms of A. polyphylla from such countries as Hungary, Moravia, etc. Nor have we been able to discern any distinguishing features of the Ciscaucasian plant that was given by Grossheim varietal status as A. vulneraria var. ciscaucasia Grossh. (the characteristics indicated by Grossheim apply equally to typical A. polyphylla Kit.); as for the other variety established by the same authority, A. polyphylla var. colchica Grossh. l. c., we have not seen any specimens of it.

× A. polyphylloides Juz. hybr. nov. in Addenda X, p. 293.— A. arenaria Juz. × A. polyphylla Kit.).— Exs.: HFR No. 208 (saltem p. p.).

As regards general aspect, size of flowers and bracts, and indument of calyx, the form resembles A. arenaria Juz., but it differs from it in the subpatulous indument of the lowest part of stem and of petioles.

European part: Balt. (Estonian SSR), Lad.-Ilm., Dv.-Pech.? Described from the vicinity of Luga. Type in Leningrad.

Note. In the Luga area, this form occurs more frequently than the more or less typical A. polyphylla Kit.

277 8. **A. schiwereckii** (DC.) Blocki in Oesterr. Bot. Zeit. LXII (1912) 397 p.p.; Sag. in Allg. Bot. Zeitschr. (1908) 126. – A. vulneraria η schiwereckii Ser. in DC. Prodr. II (1825) 170.

Biennial to perennial, similar in all respects to A. polyphylla Kit., but stems appressed-hairy throughout or often glabrous in lower part; leaves glabrous above, slightly hairy beneath; bracts slightly hairy; calyx densely patent-hairy. June–August.

European part: U. Dns., M. Dnp., Balt. (?). **Gen. distr.**: Centr. Eur. (Banat, [former] Semigrad area, etc.). Described from Lvov. Type probably in Geneva.

Note. Because of insufficient material and lack of in situ observations, it is not possible to determine categorically the taxonomic significance of this form (probably rather limited) or its origin (whether hybrid or mutant).

9. **A. colorata** Juz. sp. nova in Addenda X, p. 293. – A. vulneraria var. colorata Meinsh. in sched.

Biennial to perennial, apparently of hybrid origin, displaying various features of A. linnaei. The contribution of this species is particularly evident in the characteristic coloring of the upper part of calyx, while the A. polyphylla parentage finds expression in the usually conspicuous, more or less patent indument of the lower part of stem or, rarely, of petioles alone. June–July (September).

European part: Balt., Lad.-Ilm. Endemic. Described from the vicinity of Narva. Type in Leningrad.

Note. The typical form (from the vicinity of Narva) is characterized by rather long ascending stems bearing numerous heads. Forms of this species from the Lithuanian SSR differ in their low growth, suberect stems, and solitary heads. It is feasible that they correspond to A. monocephalos Gilib. Fl. Lithuan. IV (1798) 97; id. Exerc. phytol. I (1799) 259. The insufficiency of material from Lithuania, the incomplete description of A. monocephalos, and unavailability of the original specimen of this species, prevent us from adopting this assumption, all the more so since treatment in the literature has followed different lines.

10. **A. caucasica** (Grossh.) Juz. comb. nova. – A. vulneraria auct. fl. Cauc. p.p. – A. variegata var. caucasica Grossh. Fl. Kavk. III (1930) 286.

Biennial to perennial; stems (1) 2 or 3, suberect or usually arched-ascending at base, 5–18 cm long, slender, erect or curved, occasionally flexuous, unbranched, densely covered throughout with short, closely appressed silvery hairs or at the very base longer and semipatent ones, 278 greenish or mostly more or less tinged with dingy purple; basal leaves few or fairly numerous, in a rather loose rosette; lateral leaflets (1) 2–4 pairs, the uppermost pair elliptic and subacute, the others mostly lanceolate, acute, sessile or nearly so; terminal leaflet elliptic to elongate-elliptic, mostly rounded at apex; petioles with coarse appressed to subpatent hairs; cauline leaves 2 or 3, rather evenly distributed along the stem or sometimes confined to the lower half; lateral leaflets 2–4 (5) pairs, elongate-lanceolate, tapering at both ends; terminal leaflets larger, oblong or broadly oblanceolate; all leaflets with long slender loosely appressed hairs, these scattered to sporadic above, rather dense beneath; heads mostly long-peduncled, solitary or twin and then closely approximate so that peduncle of the upper head scarcely perceptible, 1–2 (2.5) cm in diameter, with a rather small to moderate number of flowers, fairly compact; bracts not exceeding calyx or scarcely exceeding it and then much shorter than corolla, mostly divided to at least two thirds to three quarters their length, not prominently veined, the acute lobes rather densely covered with fairly long thin appressed hairs; calyx 7–9 mm long and 3–4 mm broad, densely covered with rather long, loosely appressed soft hairs, the upper part dark purple; corolla bright yellow, becoming brown on wilting. July–August.

Alpine and subalpine meadows, pasture, and grassy slopes. — Caucasus: Cisc., Dag., E. and S. Transc. (?) Endemic (?) Described from Kirovabad (Mt. Koshkar-dag) in Azerbaijan. Type in Leningrad.

11. **A. lachnophora** Juz. sp. nova in Addenda X, p. 293. — A. vulneraria, 2 Ldb. Fl. Ross. I (1842) 622 et auct. plur. fl. Cauc. p. p. — A. boisieri Grossh. Fl. Cauc. III (1930) 286, saltem pro max. p., non Sagorski.

Biennial to perennial; stems (1) 2–5, usually arcuately ascending or prostrate, 10–25 cm long, rather firm, mostly curved, simple or mostly in upper half to three quarters branched, densely covered throughout with rather short appressed-incurved silvery hairs, mostly greenish, the fairly long branches arising at a very acute angle; basal leaves mostly numerous, in a fairly dense rosette; lateral leaflets 1–3 pairs, rather small, ovate, minutely petioluled; terminal leaflet larger, elliptic to elongate-elliptic, rounded at both ends, minutely mucronulate; hairs on the upper surface of all leaflets fairly dense or often sparse to very few, rather long and thin, appressed to subpatulous, arachnoid, on the lower surface rather dense,
9 appressed, varying in length; petioles and rachises of basal leaves densely appressed- to semipatulous-hairy; cauline leaves 2–4, mostly uniformly distributed along the stem; lateral leaflets (1) 2–5, narrow-ovate to elongate-lanceolate, attenuate at both ends, mostly acuminate, the indument of cauline leaves like that of the basal or the upper surface of leaflets often more densely arachnoid; heads 2–5, long-peduncled, with a moderate number of flowers, 2–3 cm in diameter, the terminal twin, the upper one of the pair usually distinctly peduncled; bracts mostly not exceeding calyx or rarely exceeding it and then usually shorter than corolla, divided to one third to three quarters their length, not prominently veined, the mostly very acute lobes densely covered with thin appressed hairs; calyx 9–12 mm long and 3.5–5 mm broad, densely covered with thin, loosely appressed hairs, mostly not colored in upper part; corolla yellow, becoming brown on wilting. June–October.

Exposed mountain slopes, taluses, and subalpine meadows and grass plots. — Caucasus: Cisc., Dag., E., W., and S. Transc. Endemic. Described from the vicinity of Tbilisi. Type in Leningrad.

Note. This species is apparently a race of the preceding species from lower locations and often delimited from it. In Ciscaucasia it is apparently linked by intermediate forms with A. polyphylla Kit. The varieties mentioned by A. A. Grossheim, l. c. (A. boissieri var. angustifolia Grossh., var. latifolia Grossh., var. caucasica Grossh., var. transcaucasica Grossh.) and probably considered by him as geographic races, can in fact hardly be distinguished (at least by the characters indicated by

Grossheim). It should, however, be noted that A. lachnophora, in the sense adopted here, is indeed an exceedingly polymorphic plant that needs detailed study. Ample material and observations in situ are necessary for this purpose.

12. **A. alpestris** Rchb. Fl. Germ. exc. (1832) 515 p.p.; Hegetschw. et Heer Fl. d. Schweiz (1840) 693; Kit. in Linnaea 32 (1863) 612; Kern. Sched. Fl. exs. austro-hung. (1882) 439; Sag. in Allg. Bot. Zeit. (1908) 55; W. Becker in Beih. Bot. Centralbl. XXVII, 2 (1910) 280. — A. glaucescens Kit. l. c. — A. alpicola Brügg. Jahresb. der Graub. naturf. Ges. (1866) 39. — A. vulneraria var. alpestris Kit. in Schult. Oesterr. Fl. ed. II (1814) 317. — A. alpestris ζ carpaticola Sag. l. c. 57. — Ic.: — Hegi, Ill. Fl. IV, 3, f. 1428. — Exs.: Kern. Fl. exs. austro-hung. No. 435.

280 Biennial to perennial; stems 6—20 cm long, suberect, rather robust, mostly but slightly exceeding rosette leaves, appressed-hairy; basal leaves numerous, bright green, glabrate, the very large terminal leaflets 3—3.5 cm long; lateral leaflets often wanting; cauline leaves 1—3, mostly confined to lower part of stem; heads large, on leafless peduncles; bracts equaling or mostly shorter than calyx, dissected to two thirds to three quarters, with subacute or acute lobes; calyx (12) 13—17 mm long, subcylindric, smoky-gray, rarely yellowish white, with long and more or less spreading hairs, slightly inflated in fruit; corolla large, sulfureous; limb of standard 9 mm long and 6 mm broad, the claw 9 mm long. June—July.

Alpine meadows and pastures. — European part: ? U. Dns. (Carpathians). **Gen. distr.:** Centr. Eur. Described from Switzerland. Type apparently in Vienna.

13. **A. affinis** Britt. in Mert. u. Koch, Deutschl. Fl. V. (1839) 124. — A. alpestris Rchb. l. c. p.p.; Sag. in Allg. bot. Zeitschr. (1908) 124 W. Becker in Beih. Bot. Centralbl. XXVII, 2 (1910) 282. — A. carpathica Pantocs. in Mag. Növ. Lap. VI (1882) 162. — Exs.: Kern. Fl. exs. austro-hung. No. 436.

Biennial to perennial; stems mostly several, 12—30 cm long, erect except at slightly ascending base, robust, appressed-hairy or at base sometimes somewhat patent-hairy; basal leaves with very large terminal leaflet; cauline leaves 2—4, commonly confined to lower part of stem; all leaves glabrous above, with short appressed hairs beneath; heads several, large; peduncles mostly long, flexuous; bracts not exceeding or scarcely exceeding calyx, divided to half to three quarters, the lobes obtuse or even rounded at apex; calyx 9—11 mm long, inflated, mostly patent-hairy, pale or the teeth sometimes purple-tinged; corolla mostly light yellow; keel often purple; limb of standard 7—8 mm long and 5—6 mm broad, the claw 7 mm long. May—June.

Mountain meadows and slopes. — European part: U. Dns. (Carpathians). **Gen. distr.:** Centr. Eur. Described from Germany. Type apparently in Vienna.

Note. A characteristic Hungarian form, A. leiotricha Borb., in Pallas Lexicon 13 (1896) 318 (pro var. A. polyphyllae), published in Fl. Hung. exs. No. 685, is intermediate between A. affinis Britt. and A. polyphylla Kit. In habit and hairiness it is very reminiscent of A. affinis, but differs markedly in the numerous large heads and the longer calyx. It may possibly occur in U. Dns.

Genus 794. **SECURIGERA** * DC. **

DC. in Lam. et DC. Fl. Franc. ed 3, IV (1805) 609

Calyx short-campanulate, slightly bilabiate, the upper teeth being united for much of their length; keel curved, beaked; pod linear, flattened laterally, with thickened margin and channeled ventral suture, indehiscent or finally separating into 2 valves, many-seeded, constricted between seeds, terminating in a hooked beak. Annuals.

Note. Although this species was already described in 1777 under the name Bonaveria, the name Securigera is to be retained as "nomen conservandum."

1. **S. securidaca**† (L.) Degen u. Dörfler in Denkschr. Akad. d. Wissensch. Wien. LXIV (1897) 718; Asch. et Gr. Synopsis IV, 2 (1906–1910) 649. – Coronilla securidaca L. Sp. pl. (1753) 753. – Securidaca lutea Mill. Gard. Dict. ed. 8 (1768) No. 1. – Securidaca legitima Gaertn. De fruct. II (1791) 337. – Securigera coronilla DC. in Lam. et DC. Fl. Franc. IV (1805) 609; Shmal'g., Fl. I, 249. – Coronilla parviflora M. B. Fl. taur.-cauc. II (1808) 173. – Bonaveria securidaca Desv. Journ. Bot. I (1813) 120; Ldb. Fl. Ross. I, 698; Grossg., Fl. Kavk. II, 287. – Bonaveria securigera Endl. ex Heynh. Nomencl. II (1840) 73. – Ic.: Rchb. Ic. Fl. germ. XXII, tab. 2189, f. I, II, 1–10. – Exs.: Herb. Fl. Cauc. No. 276; Deg. u. Dörfl. No. 141; Pl. Herceg. exs. No. 60.

Annual, glabrous throughout or stem at the base of internodes and base of peduncles sometimes hirtellous; stems often several from the root, hollow, angled, erect or ascending; leaves petiolate, imparipinnate; leaflets 5–7 pairs, crowded in upper part of leaf, minutely petioluled, cuneate, entire, truncate or emarginate, mucronate or muticous, 1–2 cm long and 0.5–1 cm broad, somewhat glaucescent beneath; stipules oblong-linear, 1–3 (5) mm long and 1–2 mm broad; inflorescence an umbellate raceme, 6–8-flowered; peduncles to 10 cm long or even longer, greatly exceeding subtending leaves; bracts minute, deflexed; pedicels about equaling calyx; calyx 2 mm long, the triangular-lanceolate teeth ca. 1 mm long, equaling the tube; petals yellow, ca. 10 mm long; standard orbicular, obscurely retuse, 8–9 mm long and 5–6 mm broad; wings ca. 8 mm long and 4 mm broad; keel 7.5–8 mm long and 2–2.5 mm broad; ovary with incurved style 2–3 mm long; pods to 10 cm long, patent, hooked at tips, the valves papillose; seeds 4-angled, flattened, brown, to 3.5 mm long and to 2 mm broad. May–June. (Plate XVIII, Figure 3).

Deciduous woods, scrub, gardens, and as weed at roadsides and in fields. – European part: Crim.; Caucasus: E. Transc., Dag., Tal. **Gen. distr.**: W. Med., Bal.-As. Min., Arm.-Kurd. Described from Spain. Type in London.

Note. All parts of the plant have an unpleasant bitter taste.

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* From Latin securis — ax, sword, and gero — to carry; the flattened fruits of Securigera resemble a sword.

** Treatment by E. I. Steinberg.

† Name of a weed occurring in lentil fields, as mentioned by Pliny.

Genus 795. **DORYCNIUM** * L. **

L. Gen. pl. ed. 1 (1737) 228.

Leaves with 5–7 leaflets (pair of lower leaflets regarded by some authors as leaflike stipules), true stipules rudimentary; leaflets entire, with well defined midrib. Flowers small, in capitate globose umbels, on rather long peduncles in axils of upper leaves; calyx campanulate, sometimes almost bilabiate, 5-toothed; wings united anteriorly, with longitudinal folds or gibbosity; keel obtuse; staminal tube not united with petals; style with capitate stigma, long-persistent in fruit; pod ovate or oval-conical, dehiscent, with one to several seeds, exceeding calyx. Perennial herbs.

1. Calyx deeply divided, not bilabiate, the lance-subulate teeth about equaling or slightly longer than the tube; mature pods 6–8 mm long; leaves 5–10 (13) mm broad in upper part. . . . . . 1. **D. graecum** (L.) Ser

+ Calyx slightly bilabiate, the triangular teeth shorter than the tube; mature pods ca. 3 mm long; leaves (2) 3–6 (7) mm broad in upper part . . . . 2. **D. intermedium** Ldb

1. **D. graecum** (L.) Ser. in DC. Prodr. II (1825) 208. – D. latifolium Willd. Spec. pl. III (1800) 1397; M. B. Fl. taur.-cauc. II, 221; III, 514; Ldb. Fl. Ross. I, 559; Boiss. Fl. Or. II, 162; Shmal'g., Fl. I, 247; Rikli in Engl. Botan. Jahrb. 31 (1902) 348; Grossg., Fl. Kavk. II, 287. – D. ibericum Willd. Enum. berol. suppl. (1813) 52, nomen nudum. – Lotus graecus L. Mant. (1767) 104; K. Wein in Fedde Repert. XXVIII (1930) 208; J. Bornmüller in Fedde Repert. XLV (1938) 78. – Lotus belgradica Forskål in Flora Aegyptiaco-arabica Cent. III (1775) 215. – Exs.: Fl. cauc. exs. No. 38 (sub. D. latifolio Willd.).

283 Perennial, with a woody taproot; stems 1 to several, 1–3 mm thick at base mostly erect, branched, to 70 cm long, somewhat roughened in upper part with more or less ferruginous crisp hairs, glabrate in the woody lower part; leaves sessile or obscurely petiolate; leaflets 5–7, larger than in the next species, oblong-ovate or obovate, often cuneate at base, obsoletely mucronulate, 10–30 (40) mm long and 5–10 (13) mm broad in the broader upper part, glabrate and darker above, with long hairs on the lighter lower surface, especially on the midrib, the margin ciliate; inflorescence an umbellate head, 12–16 mm in diameter, containing 12–25 flowers; peduncles from axils of upper leaves, 30–50 mm long; flowers ca. 5–7 mm long, on pedicels to 1.5 mm long, pale pink to white with standard pink at base and keel blackish violet in upper part; calyx with long subappressed hairs of varying density; calyx-teeth equal, lance-subulate, as long as or slightly longer than tube; standard exceeding keel and wings, obovate when expanded, ca. 6–7 mm long and 3 mm broad; wings including claw ca. 3.5 mm long; keel including claw ca. 3 mm long; claw of keel and of wings ca. 1.5 mm long; ovary 2.5–2.6 mm long, 9- or 10-ovuled; pod large, oblong-conical, acute,

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* According to Dioscorides, derived from doryknion, the name of a shrub growing at the seaside. According to Pliny, the generic name is derived from the name of a plant the sap of which was used as a poisonous coating for spears (dory – spear, and knaein – to smear). It is thought, however, that the name Dorycnium referred to some other plant and was transferred to this leguminous genus in the 16th century.

** Treatment by E. I. Steinberg.

6–8 mm long, several times length of calyx, 1- or 2-seeded, spuriously septate between ovules. May–September. (Plate XVIII, Figure 2).

Glades and forest margins, stony and calcareous slopes. – European part: Crim. (rare); Caucasus: Cisc., Dag., W. and E. Transc. **Gen. distr.**: Bal.-As. Min. Described from the vicinity of Istanbul. Type in London.

2. **D. intermedium** Ldb. Ind. sem. hort. Dorp. (1820) 14; Boiss. Fl. or II, 162. – D. herbaceum f. intermedium Rikli in Engl. Bot. Jahrb. XXXI (1902) 358. – D. herbaceum Grossh., Fl. Kavk. II (1930) 287, non Vill. – D. herbaceum auct. Fl. Ross., non Vill. – D. monspeliense M. B. Fl. taur.-cauc. I (1808) 221, non Willd. – D. pentaphyllum α patentipilosum Ldb. Fl. Ross. I (1842) 559. – Exs.: HFR No. 762, 1760.

Perennial, with a woody taproot to 1 cm thick near the collar; stems 0.5–2 (3) mm thick at base, ascending, branched, to 50 (70) cm long, covered in upper part with soft subpatulous as well as crisp or rarely appressed hairs, in the lower woody part glabrous; leaves sessile or obscurely petiolate; leaflets oblong-cuneate or oblong-obovate, rounded at apex or acuminate, sometimes mucronulate, 5–19 mm long and (2) 3–6 (7) mm broad in the broader upper part, covered on both sides with straight appressed and apparently implexed soft hairs; inflorescence a dense umbellate head 10–12 mm in diameter, containing 15–25 rather small flowers; peduncles from axils of upper leaves, 20–50 mm long; flowers 4–5 mm long, on pedicels ca. 2 mm long; calyx appressed-pubescent, slightly bilabiate, the triangular teeth two-fifths to half as long as tube, the upper broader than the lower; standard guitar-shaped, ca. 5 mm long including claw and 1.5 mm broad, somewhat exceeding wings and keel; wings including claw 3.5–4 mm long, the claw ca. 1–1.5 mm long; keel including claw ca. 3 mm long, the claw 1–1.25 mm long; ovary ca. 2 mm long, 9- or 10-ovuled; pod ca. 3 mm long, about twice length of calyx, brownish, ovaloid to oblong-ovoid, acuminate, 1-seeded, the style long-persistent. May–August. (Plate XVIII, Figure 1).

Hills, calcareous and stony slopes, forest margins, and scrub. – European part: Bes., Crim.; Caucasus: Cisc., Dag., W. and E. Transc. **Gen. distr.**: Bal.-As. Min., Arm.-Kurd. Described from the Crimea. Type in Leningrad.

Rikli, in his monograph of the genus (Engl. Bot. Jahrb. XXXI (1902) 358), maintains that D. intermedium Ldb. constitutes an eastern race of D. herbaceum Vill., described from France. He regards D. herbaceum Vill. as a distinct species in a state of formation.

According to A. A. Grossheim (l. c.), the only form occurring in the Caucasus is the pubescent ssp. illyricum Beck, described as a variety (Flora von Südbosnien und der angrenzenden Hercegovina in Ann. des Naturh. Hofmus. II (1896) 176) for Dalmatia, Herzegovina, and Serbia. This form is considered by Gams (Hegi, Illustr. Flora v. Mitteleurop. IV, 3, 1382) as being identical with the form glabratum Rikli. Grossheim's interpretation does not fully reflect the actual situation, since the ample herbarium material in the BIN shows that strongly pubescent specimens also occur in the Caucasus. As regards flower color, besides the usually white flowers with violet keel, one can also find completely white flowers (f. albiflorum Aschers. et Gr.). In a form found by N. A. Troitzky in the vicinity of Tbilisi, f. variegatum Troitzky, the standard and the lower part of the keel are violet, while the tip of the keel is white.

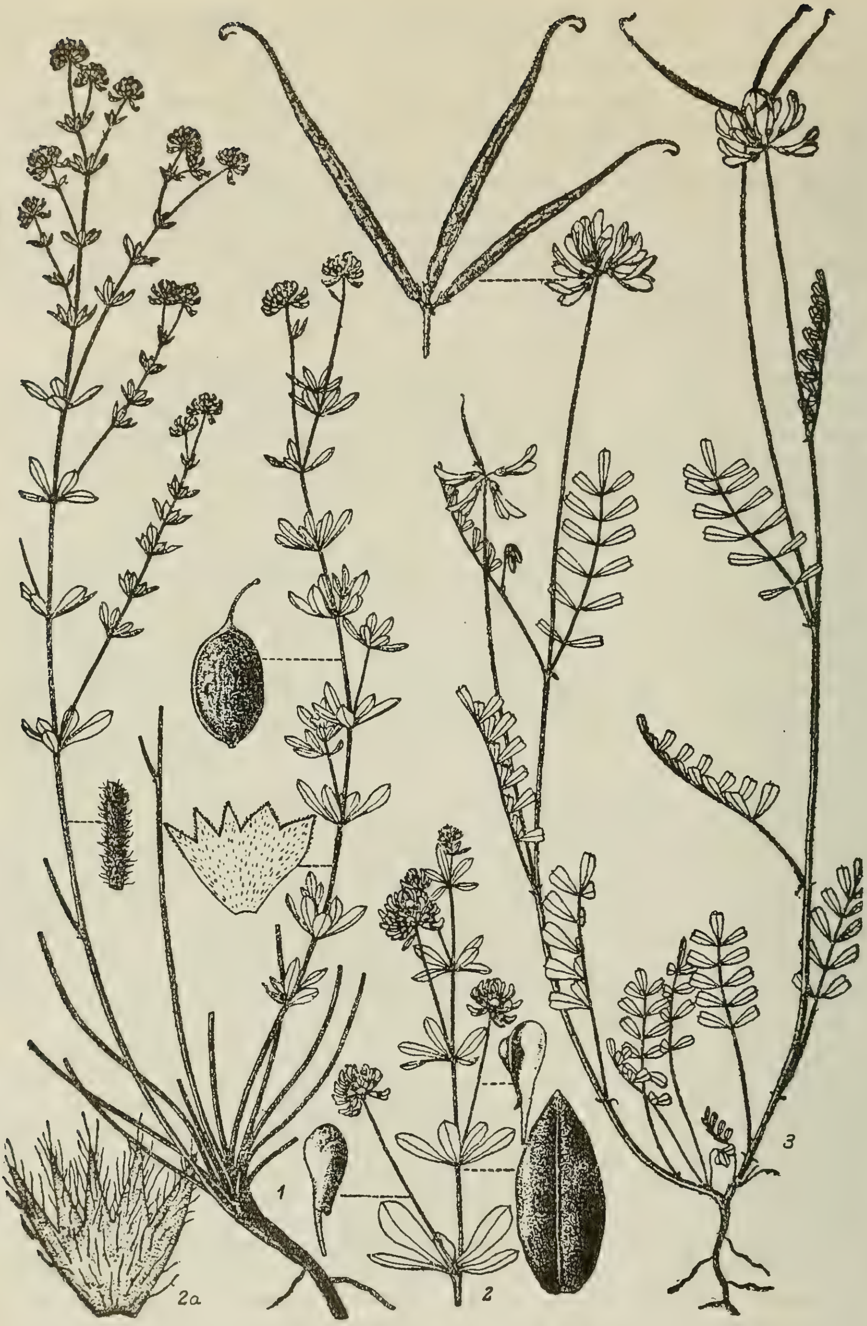

PLATE XVIII. 1 — Dorycnium intermedium Ldb., aspect, portion of stem with inflorescences, calyx, pod; 2 — D. graecum (L.) Ser., plant fragment, wing from the outside and from within, pod; 2a, calyx; 3 — Securigera securidaca (L.) Deg. et Dörfl., aspect, pods.

Genus 796. **LOTUS** * L.**

L. Sp. pl. (1753) 775.

Calyx 5-toothed; petals free at base; keel strongly incurved, beaked; upper stamen free; filaments unequal, dilated; style gradually attenuated; pod linear, cylindric, straight or subfalcate, many-seeded, dehiscing by 2 valves, sometimes septate between the seeds. Herbs with 5-foliolate leaves, the lower pair of leaflets close to base of petiole, stipulelike; flowers in few-flowered umbels in the axils of upper leaves.

1. Pod compressed, arching, tuberculate . . . . 1. **L. ornithopodioides** L.
+ Pod cylindric, straight, sometimes constricted between seeds . . . . . . 2.
2. Calyx conical; limb of standard longer than the claw; keel incurved at a right angle; lower pair of leaflets replacing stipules, differing in shape from upper leaflets . . . . 3.
+ Calyx cylindric; limb of standard shorter than the claw; keel slightly incurved; all leaflets alike . . . . . . 2. **L. strictus** Fisch. et Mey.
3. Calyx slightly bilabiate, pubescent within, the 2 lower teeth broader than the upper; corolla pink . . . . 4.
+ Calyx glabrous within, with equal teeth; corolla yellow . . . . 5.
4. Plant glabrous, glaucescent; leaflets large, broadly obovate, mucronate; corolla 18–20 mm long . . . . 3. **L. gebelia** Vent.
+ Plant lanate; leaflets small, obovate, muticous; corolla 14–16 mm long . . . . 4. **L. aleppicus** Boiss.
5. Flowers in umbellate inflorescences of 5–12; corolla 10–18 mm long; leaflets broadly obovate . . . . 6.
+ Flowers solitary or paired or else 3 or 4 together; corolla 5–10 mm long; leaflets obovate, lanceolate, or narrowly lanceolate . . . . 8.
6. Plant with creeping stolons; flowers in umbellate inflorescences of 6–12; calyx-teeth stellate before anthesis . . . . 5. **L. uliginosus** Schkuhr.
+ Plant devoid of creeping stolons; flowers in umbellate inflorescences of 5; calyx-teeth erect before anthesis . . . . 7.
7. Plant glabrous or rather sparingly appressed-hairy; flowers 10–15 mm long; pods 20–25 mm long . . . . 7. **L. corniculatus** L.
+ Plant sparsely covered throughout with long white bristles; flowers 15–18 mm long; pods 30–40 mm long . . . . 6. **L. caucasicus** Kupr.
8. Plant glabrous; bracts reduced to blackish-brown tubercles . . . . . 10.
+ Plant hairy; bracts absent . . . . 9.
9. Flowers 1 or 2 (3); corolla becoming red on drying; leaflets of median cauline leaves oblong-obovate, rounded at apex . . . . 9. **L. frondosus** Freyn.
+ Flowers (2) 3 or 4; corolla becoming blue on drying; leaflets of median cauline leaves lanceolate to lance-linear, acuminate . . . . 8. **L. tenuis** Kit.

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* A name applied by ancient authors to a large number of plants, including certain clovers.

** Treatment by L. A. Kupriyanova.

10. Perennials, 50–70 cm high; flowers (2) 3–(4); leaflets 10–20 mm long and 4–8 mm broad; pods 14–15 mm long and 2 mm broad . . . . 12. **L. palustris** Willd

+ Annuals or biennials, 7–30 cm high; flowers 1–3 together; leaflets 7–16 mm long and 2–5 mm broad; pods 16–30 mm long and 1.5–2 mm broad 11

11. Annual, erect; leaflets acuminate; flowers solitary or paired; pods 16–20 mm long and 1.5–2 mm broad. . . . . . 10. **L. praetermissus** Kupr

+ Annual or biennial, with prostrate or ascending stems; leaflets obovate, obtusish, rarely acuminate; flowers 2 (3); pods 20–30 mm long and 1.5–2 mm broad . . . . 11. **L. angustissimus** L

Section 1. **LOTEA** Ser. in DC. Prodr. II (1825) 209. – Calyx bilabiate, the 3 upper teeth shorter than the lower; limb of standard shorter than the claw; pods compressed, tuberculate.

1. **L. ornithopodioides** L. Sp. pl. (1753) 1091; Grossg., Fl. Kavk. II, 288. – Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 133.

Annual; stems few, ascending, divaricate, 25–40 cm long, branched, covered throughout with short crisp hairs, the lower pair smaller than the upper, 5–7 mm long and 4–5 mm broad, the upper 3 obovate to rhombic, with soft appressed hairs on both sides; peduncles 2–4 cm long; flowers 3–5 in the axil of the upper trifoliolate leaf; calyx bilabiate, the 3 upper teeth shorter, triangular, the lower 2 long, lanceolate; corolla light yellow; standard 7–8 mm long, the orbicular and slightly retuse limb two-thirds as long as the cuneate claw; wings 8 mm long, incurved, the obovate limb as long as the claw of the keel; pod flat, curved, tuberculate, 4 cm long and 3 cm broad.

Wet meadows. – European part: Crim. (Kara-su); Caucasus: W. Transc. (Vittman). **Gen. distr.**: Bal.-As. Min., W. and E. Med., Centr. Eur. Described from Sicily. Type in London.

Section 2. **STRICTELLA** Kupr. – Calyx cylindric, gibbous; keel slightly incurved; limb of standard shorter than the claw; leaflets all alike; stigma capitate.

289 2. **L. strictus** Fisch. et Mey. Ind. Sem. Hort. Petrop. II (1835) 32; Ldb. Fl. Ross. I, 560; Kryl., Fl. Zap. Sib. VII (1935) 1613.

Perennial, glabrous except for short appressed hairs in upper part; stems 40–75 cm long, erect, stout, branched, somewhat woody in lower part; leaves 5-foliolate, resembling those of Dorycnium latifolium; all leaflets short-petioluled, oblong-obovate, gradually narrowing toward base, rounded at apex, 20–25 mm long and 5–10 mm broad; peduncles not more than 2–3 cm long; flowers in umbellate inflorescence of 3–6; pedicels 2–4 mm long; calyx with very short appressed hairs, 7–9 mm long, tubular, the narrowly triangular teeth slightly shorter than the tube; corolla light yellow, dark-nerved; standard 10–12 mm long, the thick cartilaginous claw twice as long as the limb, this orbicular, slightly retuse; wings 10–12 mm long, the limb one and a half times as long as the claw; keel 9–11 mm long, narrow, slightly incurved, with a dark purple limb; style with capitate stigma; pod 25–40 mm long and 3 mm broad, cylindric, dark brown. Fl. July–beginning of August.

Slopes and wet solonetzic meadows.— Caucasus: S. Transc.; W. Siberia: Alt. (SW), Irt. (E.); Centr. Asia: Dzu.-Tarb. Described from the Aras River. Endemic. Type in Leningrad.

Note. L. strictus Fisch. et Mey., described from the Aras River (Transcaucasia) and fully identical with the species described, occurs in Dzu.-Tarb. and in S. Altai. The disjunct distribution area should be noted.

Most closely akin to our species is L. albus Janka, distributed in Turkey and in the Balkans, as well as L. terminalis Boiss., described from Greece; the latter differs in having more flowers in the umbel. The morphological differences between the three species are very slight and they all represent a single group that differs markedly from other Lotus species in stems being woody in lower part, in uniform leaflets, the cylindric gibbous calyx, the limb of standard shorter than the cartilaginous claw, the slightly incurved keel, and the capitate stigma. Thus the only character shared by this group and the genus Lotus in general is the long cylindric pod. All the other features are rather characteristic of the genus Dorycnium.

Boissier, in his description of L. terminalis, mentions the affinity to the genus Bonjeanea which was separated by Reichenbach from Dorycnium on account of the septate pod, but pods with similar septa between the seeds also occur in species of the genus Lotus.

We are disinclined to refer these species to the genus Dorycnium, but we find it necessary to separate them from the section Eulotus as a distinct section.

Section 3. **EULOTUS** Ser. in DC. Prodr. II (1825) 210.— Calyx conical; keel incurved at a right angle, the limb exceeding the claw; pods linear, cylindric.

Series 1. **Gebelia** Kupr.— Calyx obscurely bilabiate; corolla large, pink; pods slightly constricted between seeds.

3. **L. gebelia** Vent. Jard. Cels. tab. 57 (1800).— L. gebelia var. genuinus Boiss. Fl. or. II (1872) 168; Grossg., Fl. Kavk. II, 289.

Perennial, glabrous throughout, glaucescent; stems numerous, rarely solitary, 25–40 cm long, ascending to suberect, woody in lower part, flexuous, divaricately branched; lower pair of leaflets, replacing stipules, obliquely ovate, the upper 3 broadly obovate, acuminate, 16–18 mm long and 6–10 mm broad; peduncles not more than 4 mm long; flowers pink, 17–20 mm long, 2 or 3 in the axil of the upper trifoliolate leaf; standard 16–19 mm long and 11–12 mm broad, broadly obovate, retuse, one and a half times as long as keel; wings 14–15 mm long, the obliquely ovate limb three times length of the claw; keel incurved at a right angle, dark purple at tip; calyx broadly conical, bilabiate, the triangular teeth white-hairy within, the upper 2 broader than the others. May–June. Pods 20–30 mm long, 4 mm broad, slightly constricted between seeds, light brown. (Plate XIX, Figure 3).

Dry gravelly mountain slopes.— Caucasus: S. and E. Transc., Tal. **Gen. distr.**: E. Med., Arm.-Kurd., Iran. Described from Aleppo.

4. **L. aleppicus** Boiss. Diagn. ser. 1, IX (1849) 33.— Gebelia var. villosus Boiss. Fl. or. II (1872) 168; Grossg., Fl. Kavk. II (1930) 289.— L. corniculatus γ hirsutissimus Ldb. Fl. Ross. I (1842) 561.

Perennial, hirsute; stems numerous, simple, 20—30 cm long; leaflets small, the lower obliquely ovate, the 3 upper obovate, obtusish, 10—12 mm long and 5—7 mm broad; peduncles equaling leaves; flowers pink; calyx patent-hirsute, the teeth subulate-acuminate from lanceolate base, longer than tube; standard 15—16 mm long and 9—11 mm broadly obovate, exceeding the keel, this incurved at a right angle and cuneate-pointed; pod 4—5 times as long as calyx. May—June.

Caucasus: E. Transc. **Gen. distr.**; E. Med., Arm.-Kurd. Described from Aleppo. Type in Geneva.

Series 2. **Ebracteatae** Kupr.— Bracts none; peduncles long, robust, exceeding leaves; flowers 7—18 mm long.

291 5. **L. uliginosus** Schkuhr, Handb. II (1804) 412; Grossg., Fl. Kavk. II, 288.— Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 131 (1867—1886).— Exs.: Fl. exs. austro-hung. No. 3606.

Perennial with creeping rhizone; stems 20—60 cm long, ascending; leaflets glaucescent beneath, the lower pair sessile, broadly obovate, acuminate, 8—12 mm long and 6—8 mm broad, the upper obovate, acuminate; peduncles 7—10 cm long; flowers 8—12 in the axil of the upper 3-foliolate often deciduous leaf; calyx 5—6 mm long, the linear-lanceolate acute teeth as long as the tube, sometimes hirsute, stellate before anthesis; standard 11—12 mm long, the ovate limb as long as the claw; wings 10—11 mm long; keel 9 mm long; pod slender, cylindric, dark brown, 30 mm long and 2 mm broad. July.

Boggy meadows.— European part: Balt., U. Dns.; Caucasus: Transc. (Grossheim). **Gen. distr.**: Centr., W., and Atl. Eur. Described from Central Europe.

Economic importance. L. uliginosus is a good forage plant. As regards the high protein content and absence of prussic acid it is superior to L. corniculatus.

6. **L. caucasicus** Kupr. nom. nov.— L. major Ldb. Fl. Ross. I (1842) 56, non Scopoli (1772).— L. corniculatus var. ciliatus C. Koch Syn. ed. I (1835) 154; Boiss. Fl. or. II (1872) 165.— L. ciliatus Grossh. Fl. Kavk. II (1933) 290, non al.

Perennial; the whole plant, and more particularly the calyx, sparsely covered with long patent hairs; stems numerous, 20—50 cm long, erect or ascending, often branched; leaflets replacing stipules obliquely ovate, acuminate; upper leaflets obovate, rounded at apex, ciliate, 10—15 cm long, and 8—10 mm broad; peduncles 5—10 cm long, robust; flowers 5 in the axil of the 3-foliolate upper leaf, yellow, 15—18 mm long; calyx 6—8 mm long, the narrow teeth as long as the tube; standard 15—18 mm long, the obovate standard much longer than the claw; pod cylindric, 25—30 mm long and 2—3.5 mm broad. July. (Plate XIX, Figure 1).

Subalpine and alpine meadows, rocks, and taluses. — European part: Crim.; Caucasus: Cisc., Dag., E., W., and S. Transc. Endemic. Described from E. Transcaucasia. Type in Leningrad.

7. **L. corniculatus** L. Sp. pl. (1753) 1092; Ldb. Fl. Ross. I, 561; Shmal'g., Fl. I, 248; Syreishch.. Ill. Fl. Mosk. gub. II (1907) 301; Grossg., Fl. Kavk. II, 291; Kryl., Fl. Zap. Sib. VII, 1613. — Ic.: Syreishch., Fl. Mosk. gub. II, 301.

Perennial, mostly glabrous or sparsely white-hairy; stems numerous, 2 decumbent, ascending, or suberect, 15—40 cm long; the lower stipulelike pair obliquely ovate, mostly acuminate, 7—10 mm long and 4—6 mm broad; the upper leaflets obovate, rounded at apex, 10—15 mm long and 6—10 mm broad; leaflets of upper leaves lanceolate, acuminate; peduncles stout, 5—10 cm long; umbels 5-flowered; flowers 10—15 mm long, yellow, the standard sometimes orange; calyx 5—6 mm long, glabrous or finely hairy, the teeth as long as the tube; standard 10—15 mm long, the broadly rounded limb abruptly passing into cuneate claw; wings 10 mm long, about equaling the keel, the obovate limb four times as long as the claw; keel incurved at a right angle; pod linear, cylindric, 15—25 mm long and 2—3 mm broad. May—September. (Plate XIX, Figure 2).

Meadows and fields. — European part: Balt., Kar.-Lap., Lad.-Ilm., Dv.-Pech., U. V., U. Dns., M. and U. Dnp., V.-Kama, U. Don, L. Don, Bes., Bl., L. V., Crim.: Caucasus: Cisc., Dag., E. and W. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: N. and Centr. Eur., W. and E. Med., Iran., Bal.-As. Min., India, Australia (introduced). Described from Europe. Type in London.

Economic importance. Valued as excellent forage; as compared with clover and lucerne hay, it has softer stems, a low cellulose content, and more carbohydrates. Since the flowers contain traces of glucose and prussic acid, the plants are toxic (?) in flowering state, but they are quite innocuous in the form of hay or silage. As a component of meadow mixtures, bird's-foot trefoil is suitable for all soils and is appreciated for its remarkable longevity.

8. **L. tenuis** Kit. in Willd. Enum. pl. horti Berol. II (1809) 797. — L. corniculatus β tenuifolius L. Sp. pl. ed. I (1753) 776. — L. tenuifolius Rchb. Fl. Germ. excurs. (1830—1832) 506; Grossg., Fl. Kavk. II (1930) 290. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 130 (1867—1868). — Exs.: Fl. Hung. exs. No. 372.

Perennial, slender, glabrous, slightly pruinose; stems numerous, weak, ascending, 20—60 cm long; lower stipulelike leaflets lanceolate, the upper lanceolate to lance-linear, acuminate, 7—15 mm long and 2—4 mm broad; flowers (2) 3 or 4 together on long slender peduncles; calyx glabrous, 4—5 mm long, the linear teeth as long as the tube; corolla yellow, drying blue; standard 7—9 mm long and 5—7 mm broad, with rounded-reniform limb and cuneate claw; wings with obovate limb one and a half times length of claw; 5 keel 6—7 mm long; pod linear-cylindric, 25—30 mm long and 2—3 mm broad. June—July.

Wet solonetz meadows and sands. — European part: Bes., Bl., L. Don, U. Dns., M. Dnp., L. V. (Krasnoarmeisk and Astrakhan), Crim.; Caucasus: Cisc.; Centr. Asia: Mtn. Turkm. (Kushka). **Gen. distr.**: Centr. Eur., Med.. Described from Europe. Type in Berlin.

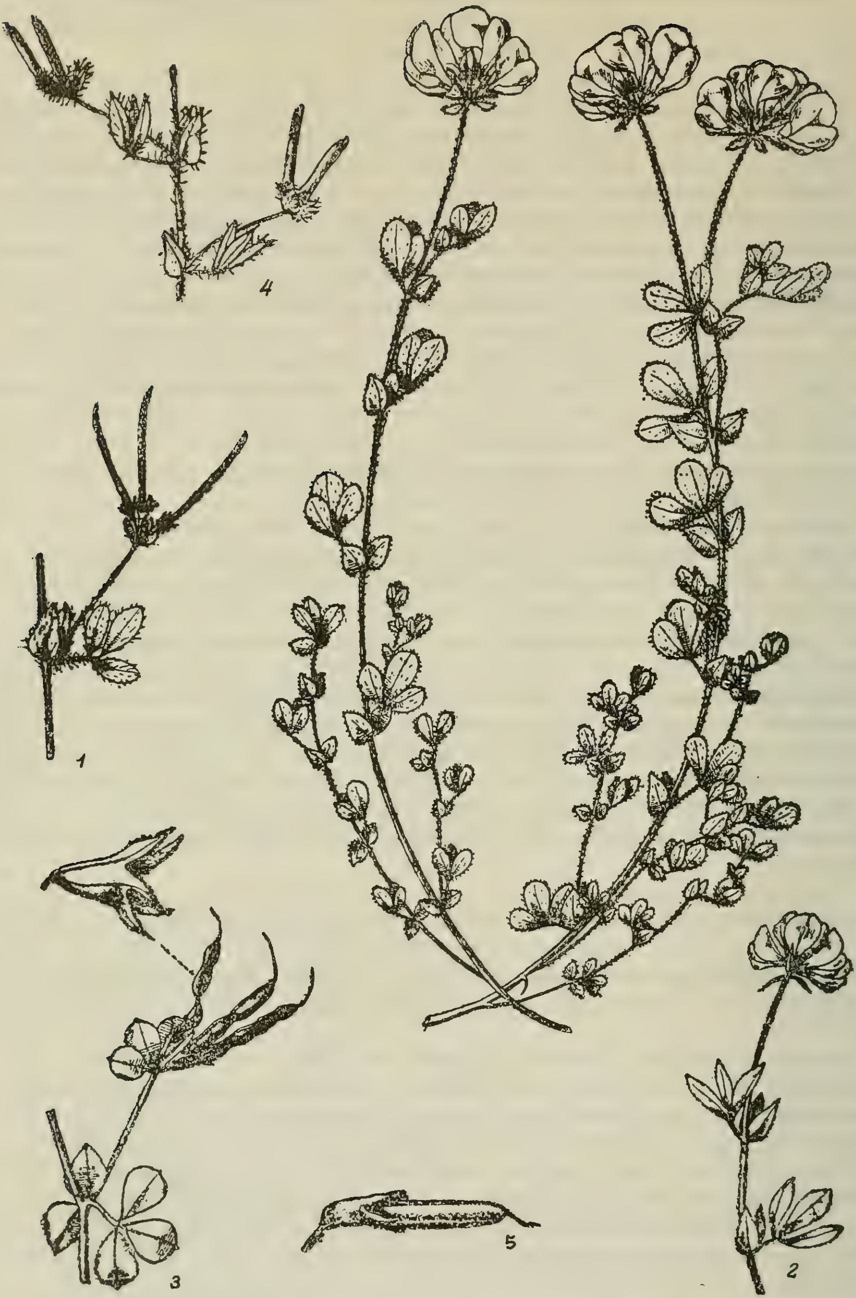

PLATE XIX. 1 – Lotus caucasicus Kupr.; 2 – L. corniculatus L.; 3 – L. gebelia Vent.; 4 – L. praetermissus Kupr.; 5 – L. angustissimus L.; 6 – Tetragonolobus siliquosus (L.) Roth, pod.

Economic importance. L. tenuis gives lower yields than L. corniculatus, but it can be sown on solonetz soils where it thrives better than the latter.

9. **L. frondosus** Freyn in Bull. Herb. Boiss. sér. 2, IV (1904) 44. — L. krylovii Schischk. et Serg. in Animadv. syst. ex Herb. Univers. Tomsk. 7–8 (1932) 5; Pavlov, Fl. Tsentr. Kazakhst. II (1935) 364; Fl. Tadzhik. V, 208. — L. corniculatus var. versicolor Bong. et Mey. Verz. am Saisang-Nor und am Irtysch gesamm. Pflanz. (1841) 18; Ldb. Fl. Ross. I, 561. — L. corniculatus Fedtsch., Rast. Turk. (1914) 511 non L.

Perennial, glabrous, glaucescent; stems numerous, 10–30 cm long, spreading, suberect or rarely ascending; lower stipulelike leaflets obliquely ovate, acuminate; upper leaflets ovate or oblong-obovate, rounded at apex, 7–13 mm long and 4–6 mm broad; peduncles 2–5 cm long; flowers 1 or 2, rarely 3 together; calyx glabrous, 5–6 mm long, the linear teeth one and a half times as long as the tube; corolla pale yellow, finally purple; standard 7–9 (rarely 10) mm long, 6–9 mm broad, the rounded-reniform limb passing into a cuneate claw; limb of wings obovate, one a a half times length of claw; keel 7–8 mm long; pod linear-cylindric, 20–30 mm long and 2–3 mm broad. April–May.

Solonetz meadows. — European part: L. V; Caucasus: Tal.; W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Pam.-Al., Kara K., Mtn. Turkm. **Gen. distr.:** Iran., Ind.-Him. Described from Turkmenia. Cotype in Leningrad.

Series 3. **Angustissimae** Kupr. — Flowers 1 or 2 (rarely 3) together, on short slender peduncles; bracts reduced to blackish-brown tubercles.

10. **L. praetermissus** Kupr. in Not. Syst. Inst. Bot. Ac. Sc. VII (1937) 37. — L. angustissimus Ldb. Fl. Ross. I (1842) 560, non L.; 560, non L.; Shmal'g., Fl. I, 249; Fl. Yugo-Vost. Evrop. ch. SSSR, V, 682, Fig. 444; Kryl. Fl. Zap. Sib. VII, 1613; Pavlov, Fl. Tsentr. Kazakhst. II, 364; Maevsk., Fl. Sr. Ross. (1933) 435. — Exs.: HFR No. 710.

Annual; root 0.5–1.5 mm in diameter; stems mostly solitary, rarely several, erect or slightly ascending, 10–30 cm long, glabrous below, in upper part with short crisp patent hairs, divaricate-branched nearly from base; lower stipulelike leaflets obliquely ovate, acuminate, 8–12 mm long and 4–6 mm broad; upper leaflets lanceolate to linear-lanceolate, 7–15 mm long and 2–5 mm broad, sparsely covered on both sides with long patent hairs; flowers 1 or 2 on short and very slender peduncles 1–2 cm long; bracts reduced to blackish-brown tubercles; calyx 4–5 mm long, with long thin implexed hairs, the filiform teeth slightly longer than the tube; corolla light yellow, 5–6 (7) mm long; standard orbicular, cuneate at base, 4–6 mm long; keel 5 mm long; pod 16–20 mm long and 1.5–2 mm broad, cinereous-brown; seeds brown. June–July. (Plate XIX, Figure 4).

Wet sandy places and bottomlands. — European part: Transv., Bl., L. Don, L. V., V.-Don; W. Siberia: U. Tob. (S.); Centr. Asia: Ar.-Casp. (N.). Described from the Ukraine. Type in Leningrad.

11. **L. angustissimus** L. Sp. pl. (1753) 1090; Boiss. Fl. Or. II (1872) 176; Grossg., Fl. Kavk. II, 228. — L. molissimus S. G. Gmelin ex Ldb. Fl. Ross. I (1842) 560. — Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 136 (1867—1868). — Exs.: Fl. Austro-hung. No. 3605; Dorfler, Herb. Norm. No. 5252.

Annual or biennial; root 2—3 mm in diameter; stems numerous, 7—20 cm long, prostrate, rarely ascending, rufescent and glabrous at base, in upper part with long patent soft as well as short crisp hairs; leaflets densely covered on both sides with more or less appressed hairs, the lower stipulelike, obliquely ovate, obtusish or rarely acuminate, the upper obovate or lanceolate; peduncles 2.5—4 cm long, slender; flowers in 2's (3's) in the axil of the upper 3-foliolate leaf; bracts reduced to yellowish-brown tubercles; flowers light yellow, 6—8 mm long; calyx 5 mm long, more or less appressed-hairy, the linear teeth one and a half times as long as the tube; standard orbicular, gradually cuneate-attenuate toward base, (5) 6—7 mm long and 3.4 [3—4 ?] mm broad; keel 6 mm long; pod slender, 20—39 mm long and 1.5—2 mm broad; seeds orange-brown. June. (Plate XIX, Figure 5).

Meadows. — European part: Crim.: Caucasus: W. and E. Transc. **Gen. distr.**: W. and E. Med., Bal.-As. Min., Iran. Described from S. France. Type in London.

12. **L. palustris** Willd. Sp. Pl. III (1800) 1394; Ldb. Fl. Ross. I, 562. — L. lamprocarpus Boiss. Diagn. ser. I, IX (1849) 33; Grossg., Fl. Kavk. II, 289.

Perennial; root 3—4 mm in diameter; stems numerous, erect or ascending 50—70 cm long, branched, covered throughout with gray patent hairs; leaflets covered on both sides with soft appressed gray hairs, the lower stipulelike, obliquely ovate, acuminate, 6—16 mm long, 4—8 mm broad, the upper ovate, obovate, or oval, 10—20 mm long and 4—8 mm broad, peduncles slender, 4—5 mm long; flowers (2) 3 (4) together; bracts reduced to blackish-brown 297 tubercles; calyx 7 mm long, covered with short thin patent hairs, the linear teeth one and a half times as long as the tube; corolla light yellow, 8—9 mm long; standard orbicular, cuneately attenuate toward base, 8—9 mm long; keel 7 mm long; pod 14—15 mm long and 2 mm broad, glaucescent-brown. July.

Wet boggy meadows. — Caucasus: W. Transc. **Gen. distr.**: Bal.-As. Min., E. Med. Described from the Balkan Peninsula. Type in Berlin.

Genus 797. **TETRAGONOLOBUS** * SCOP. **

Scop. Fl. carniol. ed. II, 2 (1772) 87.

Calyx with 5 subequal teeth; keel arching, beaked; stamens diadelphous; style glabrous, thickened at top; stigma oblique; pod terete or cylindric, the 4 nerves dilated into wings. Annual or perennial herbs with suberect stems, 3-foliolate leaves, and large solitary flowers.

1. Perennial; flowers yellow . . . . 1. **T. siliquosus** (L.) Roth
+ Annual; flowers purple . . . . 2. **T. purpureus** Moench

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* From Greek tetragonos — tetrahedral, and lobos — pod.

** Treatment by A. S. Lozina-Lozinskaya.

1. **T. siliquosus** (L.) Roth, Tent. Fl. Germ. I (1788) 323; Boiss. Fl. or. II. 175; Ldb. Fl. Ross. I, 567; Grossg., Fl. Kavk. II, 290. — Lotus siliquosus L. Syst. ed. X (1783) 1178. — T. tauricus Bge. ex Nym. Consp. (1879) 182. — T. prostratus Moench, Meth. (1794) 164. — Ic.: Coste, Fl. Fr. I (1901) 357; Fedch. and Fler., Fl. Evr. Ross., Fig. 462.

Perennial; stems suberect, branched, sulcate, covered with rather long rufescent hairs, rather densely so in upper part; leaves on petioles to 5 mm long, glaucescent, with long appressed hairs on both sides, more densely so at margin; leaflets with prominent midrib, obovate or ovate-lanceolate, cuneate at base, acuminate, to 3 cm long and 1 cm broad; stipules oblong or oval, acuminate or rounded at apex, asymmetrical, to 1 cm long; flowers solitary, on peduncles to 5 cm long; pedicels 2—3 mm long, pubescent, with simple or ternate lanceolate bracts; calyx tubular, to 18 mm long, divided nearly to the middle; teeth acute, green, with rufescent hairs at margin; tube yellowish with red spots, glabrous, prominently nerved; corolla yellow; standard orbicular, 1.5 cm across, slightly emarginate or subcordate at apex, narrowing to a long claw; wings oval, 13 mm long, asymmetrical, with a thin narrow claw; keel with a curved obtuse beak; style upcurved; pod to 5 cm long, straight, cylindric, 2-winged on each valve, with an acute beak, the wings narrower than the body, rather stiff. June. (Plate XIX, Figure 6).

Wet meadows and gullies. — European part: Balt., Bes., Crim.; Caucasus: W. Transc. **Gen. distr.:** Centr. Eur., E. and W. Med., Bal.-As. Min. Described from Montpellier (France). Type in London.

2. **T. purpureus** Moench, Meth. (1794) 164; Ldb. Fl. Ross. I, 562; Boiss. Fl. or. II, 175; Grossg., Fl. Kavk. II, 290. — T. edulis Link, Enum. H. Berol. II (1822) 264. — Lotus tetragonolobus L. Sp. pl. (1753) 773. — Ic.: Coste, Fl. Fr. I (1901).

Annual; stems erect, procumbent, or suberect, succulent, sulcate, pubescent; leaves fleshy, slightly pubescent on both sides, the petiole to 1.2 cm long; leaflets oval-rhombic, acuminate, cuneately narrowed, to 5 cm long and 3 cm broad; stipules to 1 cm long, ovate, acute; peduncles short, densely pubescent; bracts 3-foliolate; calyx divided to below the middle, densely pubescent, to 1.5 cm long, the teeth acutely lanceolate; corolla purple; pod with prominent seeds; wings broader than half breadth of body, hairy on the margin. June.

Meadows. — European part: Crim.: Caucasus: W. and E. Transc. **Gen. distr.:** E. and W. Med., Bal.-As. Min. Described from Sicily.

Tribe 6. **GALEGEAE** Bronn. Diss. Legum. (1822) 134. — Stamens monadelphous; leaves pinnate or palmately compound, rarely simple. Herbs or shrubs, rarely trees.

Genus * **INDIGOFERA** * L. **

L. Sp. pl. (1753) 751.

Flowers in axillary racemes; calyx campanulate, the 5 teeth equal or the lowest longer; corolla caducous; standard obovate; stamens diadelphous; ovary sessile, many-ovuled; style short, recurved; stigma capitate; pod linear-cylindric, rarely oblong or globose, more or less inflated, rarely flat. Herbs or shrubs with imparipinnate leaves, more or less covered with appressed, often bifurcate [malpighiaceous] hairs.

A genus composed of 250–300 species, distributed throughout the tropics and the Cape Province.

1. **I. tinctoria** L. Sp. pl. (1753) 751; DC. Prodr. II (1825) 24 excl. var. β; J. G. Baker in Hooker Fl. of Brit. Ind. II (1879) 99. – I. indica Lam. Dict. III (1789) 245.

299 A shrub, 1–1.5 m high; branches virgate, sparingly covered with short appressed silvery hairs; leaves with petioles 2–4 cm long, imparipinnate, 4–8 cm long; leaflets 4–7 pairs, ovate, 1.5–3 cm long and 0.7–1.5 cm broad, tapering at base to pubescent petiolules 1–2 mm long, appressed-hairy beneath, glabrous above, thin, blackening in drying; racemes axillary, subsessile, loose, 8–16 cm long; calyx ca. 2 mm long, silvery-pubescent, the teeth as long as the tube; corolla reddish yellow, 3–4 times as long as calyx; pod 2–4 cm long and 3.5 mm thick, with white appressed hairs or subglabrous [?] rarely straight.

In the USSR cultivated in the vicinity of Batumi. The origin of the species has not been definitely ascertained, since the plant has not been found in wild state. It is assumed to be native of India. At present widely cultivated in the tropics, especially in Bengal, also in Egypt, and in Europe in Croatia and Italy. Described from India. Type in London.

Economic importance. Indigofera tinctoria yields a very important blue vegetable dye. The substance contained in the leaves is the glucoside indican ($C_{14}H_{17}O_6N$). When the leaves are killed by enzymatic action or by diluted mineral acid, this substance breaks up into glucose and indoxine which, by oxidation in alkali solution, is transformed into indigo ($C_{16}H_{10}N_2O_2$).

Stems of indigo are usually cut early in the morning and are placed in layers in a concrete-lined tank which is filled with pure cool water or (in Java) water heated to 50°C. After 8–10 hours the extract is poured into a container where, upon repeated stirring, it combines with oxygen in the air and gradually forms a precipitate. Transformation of indoxine into indigo takes two hours. The entire mass is passed through special filters and the solid residue is collected and dried; 250 kg of fresh vegetable matter yield 1 kg of solid dye. This dye reached Europe from the tropics and was originally believed to be of mineral origin ("Indian stone") until Marco Polo succeeded in establishing its vegetable origin. Indigo dye is exceptionally durable; it is not affected by acids or alkalis and does not fade in the sun, hence it is very highly valued. It is widely used for dying fabrics blue and for artists' paints; mixed with starch it is used as bluing. In 1873, Adolf Bayer succeeded in obtaining indigo pigment synthetically from aniline, naphtalene, phenylglycine, etc., and this has led to a rapid reduction in production of the vegetable dye. The pigment is also yielded by other species of Indigofera, e.g., I. anil L. (a pantropical plant), I. argentea L. (Africa), I. arrecta Hochst. (Asia). Indigofera tinctoria and other species of the genus are often cultivated in the tropics in palm plantations (Cocos nuccifera, etc.) with the object of suppressing weeds and increasing the nitrogen content of the soil.

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* From Latin indigo or indicum, name of a blue dye originally obtained from India, and ferre – to bear, yield.

** Treatment by B. K. Shishkin.

Note. The species I. gerardiana Wall. (I. mairei Pamp., non I. mairei Lev., quae est Sophora glauca Lesch.) is sometimes grown in the tropics for ornament. The plant has pink or pale violet flowers; the leaves range from 5- to 19-foliolate on the same plant, while the number of flowers in the raceme fluctuates between 8 and 30; the racemes range from shorter to longer than subtending leaves.

Genus 798. **PSORALEA** * L. **

L. Gen. pl. ed. 5 (1754) 336.

Flowers in loosely or densely capitate racemes; calyx campanulate, with unequal teeth; petals subequal; pod 1-seeded, indehiscent, the pericarp usually adherent to the seed. Perennials or shrubs, with simple or 3-foliolate leaves.

1. Stems long . . . . 2.
+ Stems reduced . . . . 3. **P. acaulis** Stev.
2. Inflorescence dense, capitate; pod with a long and broad beak . . . . 2. **P. bituminosa** L.
+ Inflorescence elongated, loose; pod beakless . . . . 1. **P. drupacea** Bge.

1. **P. drupacea** Bge. Arb. Nat. Ver. Riga I (1847) 221; Boiss. Fl. Or. II (1872) 167; Fl. Tadzhik. V, 211. — Ic.: Fl. Tadzhik., Plate 17.

Perennial; stems 70—130 cm long, erect, branched, slightly woody at base, densely covered with patent whitish hairs and brownish glands; leaves simple, often together with 3-foliolate ones, hairy beneath, minutely glandular-dotted on both sides, orbicular or oval, rather large, to 3—4 mm long and to 4—5 mm broad [cm?], coarsely dentate, especially in upper half; leaflets of 3-foliolate leaves oval or orbicular, the middle larger than the lateral; stipules linear-lanceolate, hairy; flowers 5—7 mm long, whitish-lilac, sometimes white, several in loose racemes exceeding leaves; calyx tubular-campanulate, 3—4 mm long, densely pubescent and sprinkled with brownish glands; teeth lanceolate, one longer than the others, the upper two partly united; standard short-oval; wings and keel nearly equaling standard; pod suborbicular, nutlike, gray-tomentose, ca. 5 mm long and 3—3.5 mm broad. April—August; fr. July—September (Plate XXI, Figure 3).

Steppes, loess foothills and low mountains, sometimes as weed, at altitudes up to 1,400 m. — Centr. Asia: T. Sh., Syr D., Pam.-Al., Amu D.,

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* From Greek psoraleos — repulsive, alluding to the unpleasant odor emitted by the plant's glands.

** Treatment by I. T. Vasil'chenko.

Mtn. Turkm. **Gen. distr.**: Iran. Described from the lower Zeravshan River (between Bukhara and Samarkand). Type in Leningrad.

2. **P. bituminosa** L. Sp. pl. (1753) 763. — P. palaestina Gouan in Jacq. Hort. Vind. 2 (1772) tab. 184; M. B. Fl. taur.-cauc. II (1808) 206; Ldb. Fl. Ross I, 563; Shmal'g., Fl. I, 249; Grossg., Fl. Kavk. II (1930) 291.

Perennial; stems branched, 50—60 cm long, usually profusely antrorse-hairy; leaves 3-foliolate; leaflets oblong to oblong-ovate, acute, the middle to 40—60 (70) mm long and 15—25 (40) mm broad, with petiolule 5—10 mm long, the lateral smaller, with very short petiolules; all leaflets with scattered hairs on both sides, mucronate; petiole 20—50 mm long; racemes short, dense, initially globose, subtended by 3 or 4 subulate-lobed bracts; calyx hairy, the lance-subulate teeth as long as the tube; corolla bluish violet, to 20 mm long; standard oblong, exceeding wings, these oblong, acutish, with a recurved tooth at base; keel obtuse, shorter than wings; pod ovaloid, nutlike, densely hairy (especially at base of beak), 6—7 mm long, the lanceolat falcate beak to 15 mm long. May—June. (Plate XXI, Figure 4).

Dry slopes and hills. — European part: Crim.; Caucasus: W. and E. Transc. **Gen. distr.**: Bal.-As. Min., Med. Described from Italy. Type in London.

3. **P. acaulis** Stev. ap. Hoffm. in Comm. Soc. phys.-mat. Mosq. I (1806) 47; M. B. Fl. taur.-cauc. II (1808) 206; Ldb. Fl. Ross. I (1842) 563; Boiss. Fl. Or. II (1872) 187; Grossg., Fl. Kavk. II (1930) 291. — Exs.: Herb. Fl. Cauc. No. 57

Perennial; stems reduced; leaves large, radical, scattered-hairy on both sides, 3-foliolate, the long petiole covered with whitish and black hairs; middle leaflets ovate, irregularly emarginate and sharply dentate; lateral leaflets also ovate, smaller; racemes dense, capitate before anthesis, later somewhat elongating; involucral bracts oblong-ovate; calyx profusely covered with patent black hairs; teeth unequal, one longer than the rest; 302 corolla to 14—15 mm long; standard oblong, exceeding keel and wings; wings oblong-falcate, with a recurved tooth in lower part; pod ovoid, brown or blackish, short-hairy, terminating in a lance-subulate beak. Fl. June—August; fr. from July. (Plate XXI, Figure 5).

Clays and shales; in woods up to 1,800 m. — Caucasus: W. Transc. **Gen. distr.**: Bal.-As. Min. Described from W. Georgia. Type in Helsinki.

Genus ★ **AMORPHA** [*] L. [**]

L. Gen. Pl. 1 (1737) 299.

Calyx with 5 subequal teeth; standard obovate, obtuse, short-clawed; wings and keel wanting; stamens elongated, their filaments united; ovary ovoid, sessile, with filiform glabrous style; pod oblong. Shrubs with imparipinnate leaves.

1. **A. fruticosa** L. Sp. pl. I (1753) 713; Shmal'g., Fl. I, 250. — Ic.: Duhame Trait. des Arbres et Arbust. 2, III, tab. 36.

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[*] From Greek amorphos — deformed, shapeless, from the abscence of wings and keel.

[**] Treatment by S. G. Gorshkova.

Shrub, 1–2 m high, with brown or dark brown bark, clothed (except on old branches) with short appressed white hairs; stipules acute, to 7 mm long and 0.5 mm broad; leaves imparipinnate, 9–17 cm long; leaflets 5–10 pairs, oblong-oval or oblong-elliptic, 2–4 cm long and 0.5–1.3 cm broad, with dark punctate glands, mucronate, the petiolules 1.5–2 mm long; flowers small, subsessile; racemes terminal, approximate, dense, 9–14 cm long; axillary peduncles short; bracts 0.5–1 mm long, scalelike; calyx campanulate, violet-tinged in upper part, glandular, covered with appressed white hairs, 2.5–3 mm long and 2 mm broad, the lowest tooth acute, the others obtuse; standard dark reddish violet, glabrous, 4–6 mm long and 4 mm broad, the claw 1 mm long; filaments elongated, the yellow anthers surpassing the standard; pod oblong, sparsely glandular, more or less curved, 5–7 cm long and 2 mm broad, 1- or 2-seeded, with a long curved beak; seeds 4 mm long and 1.5 mm broad, oblong-oval, more or less curved in upper part, shining, smooth, brownish. June.

Cultivated in gardens and parks, sometimes naturalized. – European part: southern regions; Centr. Asia: southern regions. **Gen. distr.**: N. Am. Described from Carolina. Type in London.

Economic importance. Suitable for group planting in gardens and parks and for consolidation of gullies. Fairly salt- and drought-resistant.

Genus 799. **GALEGA** * L. **

L. Gen. Pl. I (1737) 320. – Gallotropics G. Don Gen. Syst. II (1832) 228. – Accorombona Endl. Gen. Pl. Suppl. I (1841) 1427

Calyx campanulate, with 5 long subulate subequal teeth; filaments of all stamens connate, the upper stamen united to the middle with staminal tube; ovary sessile, many-ovuled; style filiform, glabrous, pod 2-valved, 1-seeded, linear-cylindric, subterete, many-seeded, the valves obliquely striate. Perennials with imparipinnate leaves.

1. Stem glabrous or with scattered hairs; stipules broadly lanceolate, semisagittate; inflorescence glabrate or very sparsely hairy, calyx-teeth long, filiform; pods glabrous, erect or horizontal . . . . 1. **G. officinalis** L.
+ Stem puberulous; stipules broadly ovate; inflorescence glandular-pubescent; calyx-teeth subulate, shorter than tube; pods glandular-pubescent, almost pendulous . . . . 2. **G. orientalis** Lam.

1. **G. officinalis** L. Sp. pl. I (1753) 714; Ldb. Fl. Ross. I, 568; Boiss. Fl. or. II, 191; Shmal'g., Fl. I, 250; Grossg., Fl. Kavk. II, 291. – G. vulgaris Lam. Fl. Fr. II (1778) 654. – G. persica Pers. Syn. II (1807) 330. – G. patula Steven in Bull. Soc. Nat. Mosc. XXIX, III (1856) 140. – Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 145; Baillon, Ic. Fl. Franc. I, tab. 66; Rouy, Illustr. Pl. Eur. Rar. Fasc. I, tab. 6. – Exs.: Dörfl. Herb. Normale No. 4235.

Perennial; stem 40–90 cm long, more or less bent at nodes, branched, glabrous or with scattered short appressed white hairs; stipules broadly lanceolate, semisagittate, acute, 0.5–1 cm long; leaves imparipinnate, 5–20 cm long; leaflets 5–10 pairs, oblongly linear-lanceolate, 1–4 cm long and 0.4–1.5 cm broad, mucronate, the petiolules 0.5 mm long; racemes terminal, oblong, 8–27 cm long, densely many-flowered, the long axillary peduncles exceeding leaves; pedicels the length of calyx; peduncles, bracts pedicels, and calyces very sparsely appressed-hairy; bracts narrowly linear, filiform, exceeding pedicel; calyx 4–5 mm long and 1.5 mm broad, the filiform teeth longer than the tube; corolla light bluish or almost white (var. *persica* (Pers.) Schmalh.); standard oblong-obovate, obtuse, ca. 1 cm long; wings ca. 1 cm long, with oblong auricles at base; keel obtuse, about equaling wings; pod stipitate, 2–4 cm long and 2.5–3 mm broad, glabrous, erect or horizontal (var. *patula* (Stev.) Schmalh.), septate between seeds; 304 seeds reniform, 3 mm long and 1.5 mm broad, brownish, smooth, dull. June–August. (Plate XX, Figure 1).

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* From Greek gala – milk, and agein – to act; the plant was thought to stimulate milk secretion.

** Treatment by S. G. Gorshkova.

Riverbanks and river valleys, meadows, scrub, beech woods, roadsides, an ravines. – European part: Bes., M. Dnp., U. Dns., Bl., Crim., L. V. ([former] Kalmyk Autonomous Region); Caucasus: Cisc., W. and E. Transc. **Gen. distr** Med., Bal.-As. Min. Iran. Described from Europe. Type in London.

2. **G. orientalis** Lam. Encycl. meth. II (1786) 596; Ldb. Fl. Ross. I, 568; Boiss. Fl. or II, 191; Shmal'g., Fl. I, 250; Grossg., Fl. Kavk. II, 291. – *G. montana* M. B. in Georgi, Beschr. Russ. Reichs. III (1800) 1181. – Ic.: Bot. Mag. XLVIII, tab. No. 2192; M. B. Cent. Pl. Rar. II, tab. 67; Robinson, Engl. Fl. Card. tab. No. 119.

Perennial; stem to 50 cm long, flexuous, branched, woolly-puberulent; stipules broad-ovate, 1–1.5 cm long, obtuse; leaves imparipinnate, 7–24 cm long; leaflets 5 or 6 pairs, oblong-ovate to lance-ovate; 2.5–8.5 cm long and 1.2–4.8 cm broad, acuminate, glabrous, the petiolules 0.5–1 mm long; racemes loosely many-flowered, the axillary peduncles exceeding leaves, 10–15 cm long; pedicels nearly the length of calyx; peduncles, pedicels, calyces, and pods covered with short straight glandular hairs; bracts linear acute, with long white hairs, equaling pedicel; calyx 4 mm long and 2–2.5 mn broad, the subulate-attenuated teeth shorter than the tube; corolla bright bluish violet; standard oblong-obovate, 1–1.5 cm long, obtuse; wings 1 cm long, with oblong auricles at base; keel obtuse, equaling wings; pod stipitate 2–4.5 cm long and 3 mm broad, elongate-acuminate, deflexed to almost pendulous; seeds reniform, 3–4 mm long and 1.5 mm broad, light brownish, smooth, dull. May–June.

The forest and subalpine zones, grassy and mixed-vegetation meadows, riverbanks, scrub, and beech-and-oak forests. – Caucasus: Cisc., Dag., E. and S. Transc. Described from "The Levant." Type in Paris.

Genus★ WISTARIA [*] NUTT. [**]

Nutt. ("Wisteria") Gen. Amer. II (1818) 115.

Calyx bilabiate, short, campanulate, the upper lip minutely 2-toothed, the lower with 3 large subulate teeth; petals free, 6–7 times as long as calyx;

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[*] Named for C. Wistar (1761–1818), professor of anatomy at Philadelphia.

[**] Treatment by I. V. Palibin.

standard lanceolate, to 1.5 cm long; wings resembling keel in length and shape, auricled at base; ovary short-stipitate, linear, pubescent; style curved, with capitate stigma.

5

1. **W. sinensis** (Sims) DC. Prodr. II (1825) 390. — C. K. Schn. Handb. Laubholzk. II (1912) 79. — Glycine sinensis Sims, Bot. Mag., t. 2083 (1819). — Ic.: S. et Z. Fl. Jap. (1835) t. 44. — Exs.: Flora of the Kiangsu (Nankin University) No. 14839.

A tall twining shrub or tree, with dark gray bark, drooping branches, and long pendulous racemes; leaves to 30 cm long, imparipinnate; leaflets 7–11, ovate-lanceolate to lanceolate, acuminate, rounded at base, to 30 cm [?] long, glabrous above, pubescent and lighter beneath; racemes 3–4 times as long as broad, the rachis and pedicels pubescent; pod coriaceous, to 20 cm long, grayish yellow, pubescent, dehiscent; seeds reniform-globose, yellowish brown. April–June.

There are horticultural varieties with white (Lemaire, Ill. Hort. t. 166, 1858), light violet, or dark violet flowers; there is also a race with double white flowers.

Worthy of note is also a horticultural race W. sinensis multijuga, J. D. Hook. Bot. Mag. t. 7522 = W. multijuga Van Houtte. Fl. des serres XIX, t. 2002 = W. sinensis S. et Z. Fl. Jap., t. 44, which has racemes to 0.75 m long, with pale violet-yellowish or white flowers.

Grown in all subtropical countries and comprising many cultivated forms. A very common woody plant in gardens and parks in the southern regions of the USSR. Native in E. China.

Genus ★**ROBINIA** * L. **

L. Gen. pl. (1754) 322. — Pseudo-Acacia Medik. in Vorles Churpf. Phys. Ges. II (1787) 364.

Calyx campanulate, with 5 broad teeth, of these the upper two somewhat united; corolla white or pink; standard orbicular, short-clawed, slightly reflexed, about as long as wings and keel; keel obtuse; stamens diadelphous; ovary stipitate; style hairy at summit; pod stipitate, oblong-linear, 2-valved, flattened, narrowly winged from upper suture, many-seeded. Trees and shrubs.

Robinia regelii Heer — in Sarmatian series of Bl. (Amvrosievka) and of S. Transc. (Zanga). — Robinia cfr. pseudoacacia L. var. fossilis in Tertiary of Uss. (near Vladivostok) and in Sarmatian series of Bl. (Amvrosievka).

1. Trees; stipules transformed into spines; branchlets glabrous or hairy or glandular; leaflets oblong-oval; standard 1.5–1.8 cm long; corolla white, pink, or reddish white . . . . 2.
+ Shrub, reddish-hispid; spines wanting; leaflets rounded-oval; standard 2–2.5 cm long; corolla pink . . . . 1. **R. hispida** L.
2. Plant glabrous or only pedicel and calyx with simple hairs; racemes loose, drooping; corolla white or pink; pod glabrous . . . . 2. **R. pseudacacia** L.

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* Named for Jean Robin, who introduced this plant into Europe in 1601.

** Treatment by S. G. Gorshkova.

+ Branchlets, calyces, peduncles, pedicels, and pods covered with glandular as well as simple hairs; racemes dense, mostly erect; corolla reddish white . . . . 3. **R. viscosa** Venten

1. **R. hispida** L. Mant. pl. (1767) 101; Shmal'g., Fl. I. 251. – Ic.: Bot. Mag. IX, tab. 311.

A shrub 1.5–3 m high; branchlets, peduncles, pedicels, calyces, and pods covered with long straight appressed bristles; leaves imparipinnate, 17–23 cm long; leaflets rounded-oval, 1.5–5 cm long and 1.3–3.8 cm broad, obtusely mucronulate, the petiolules 1.5–2 mm long; flowers large, inodorous racemes loose, 7–12 cm long and 5–5.5 cm broad, half as long as leaves or shorter; corolla rose or raspberry-pink; calyx 0.9–1 cm long and 7 mm broad, with triangular long-acuminate teeth; standard 2–2.6 cm long and 2–2.5 cm broad, about equaling wings and keel; wings oblong, slightly auricled at base; keel obtuse; style filiform, with short hairs at summit. June.

Occasionally cultivated in gardens and parks. – European part: M. Dnp., Bl., Crim.; Caucasus: W. Transc. (Sochi, Khosta); Centr. Asia: Kara K. (Farab, Chardzhou), Mtn. Turkm. (Ashkhabad), Syr D. (Tashkent). **Gen. distr.**: N. Am; cultivated in Centr. Eur. Described from North America. Type in London.

2. **R. pseudacacia** L. Sp. pl. (1753) 722; Shmal'g., Fl. I, 251. – Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 142, f. I–III et tab. 143, f. III–IV, 6–11. – Vernacular: name: akatsiya belaya [white].

Tree to 30–35 m high, with brown bark; stipular spines stout, to 1.5 cm long; leaves imparipinnate, 11–24 cm long; leaflets 9–21, oblong-oval, 1.5–4.5 cm long and 7–20 mm broad, obtuse, mucronulate, the petiolules 1–2 mm long; flowers numerous, large, fragrant, on rather long pubescent pedicels; racemes rather loose, drooping, to 17 cm long, shorter than leaves; corolla white or pinkish; calyx 7 mm long and 5 mm broad, densely covered with short rufescent hairs; standard 1.5–1.8 cm long and 1.3–1.5 cm broad,
309 about equaling wings and keel; wings oblong, with small obtuse auricles; kee obtuse; style filiform, hairy at summit; pod stipitate, 4–12 cm long and 1–1.4 cm broad, oblong-linear, flat, with a curved beak; seeds oblong-ovaloid, 5 mm long and 3 mm broad, brown with black spots, smooth, dull. May–June.

Cultivated in gardens and parks. – European part: Lad.-Ilm. (Pskov, Leningrad), U. V. (Moscow), V.-Kama (Kirov, Molotov [Perm], Kazan), U. Dnp. (Minsk, Vitebsk, etc.), U. Dns., M. Dnp., V.-Don, Transv. (Ufa), Bes., Bl., Crim., L. Don, L. V.; Caucasus: W. and E. Transc.; Far East: Uss.; Centr. Asia: Balkh. (Dzhambul), Kyz. K. (Kzyl-Orda), Mtn. Turkm. (Ashkhabad Keshi, Kara-Kala), Syr D. (Tashkent, Andizhan), Pam.-Al. (Dzhizak). **Gen. distr.**: N. Am. Described from Virginia. Type in London.

Economic importance. Fairly drought- and salt-resistant. The tree acquired great importance in connection with afforestation of South Russian steppes. Propagated by seed, suckers, and cuttings; fast-growing. The wood is firm, durable, hard, heavy, with dark yellow heartwood and light yellow sapwood, not cracking, polishing well. Valuable for many technical uses. The flowers yield a yellow dye (V. D. Gorodetskii, V. P. Drobov).

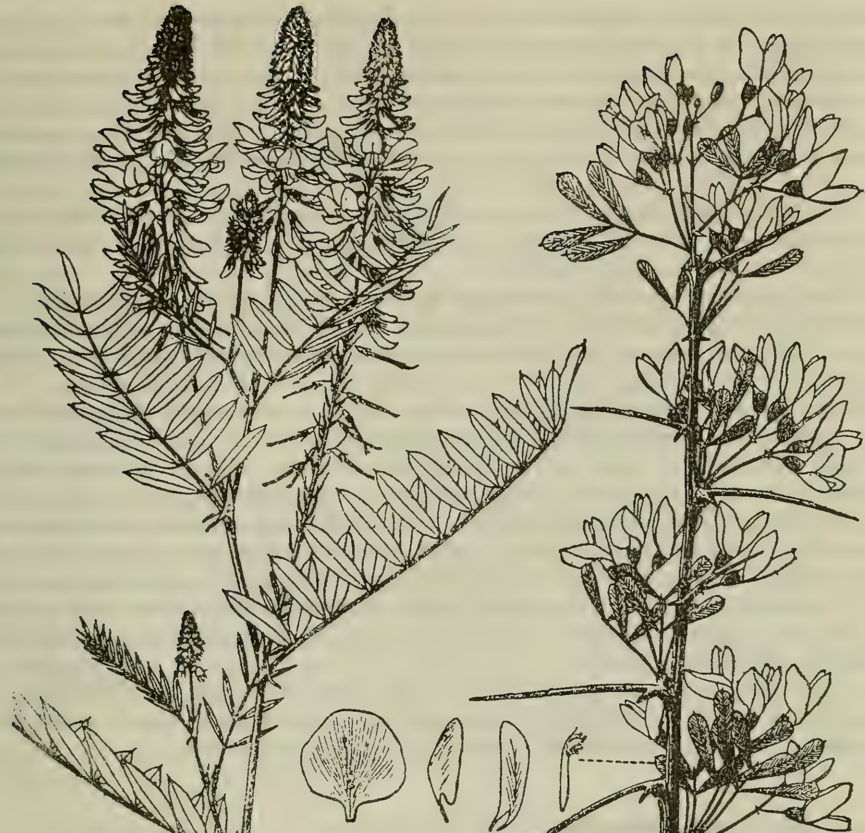

PLATE XX. 1 – Galega officinalis L., aspect, fruits, flower parts; 2 – Halimodendron halodendron (L.fil.) Voss., a flowering and a fruiting branchlet, flower parts.

Owing to rapid growth, modest soil requirements, consistent fruiting, and the high value for the development and improvement of vegetation, this tree penetrates rather rapidly into northern areas in spite of its susceptibility to frost damage (Kh. Isachenko and V. Popov). The flowers yield honey of main flow (in the Ukraine) and of superior quality. The excellent wood is used for carpentry and turnery; it also provides outstanding fuel (Glukhov).

3. **R. viscosa** Venten. Descript. de pl. nouvell. d. Jard. Cels. (1800) tab. 4. — R. glutinosa Sims, Bot. Mag. XVI (1803) tab. 560; Shmal'g., Fl. I, 251. Ic.: Rchb. Ic. Fl. Germ. XXII, tab. 143.

Tree, to 4 m high, with brown bark; branchlets, petioles, peduncles, pedicels, and pods covered with glandular as well as simple appressed white hairs; stipular spines 4—5 mm long; leaves imparipinnate, 12—20 cm long; leaflets 13—25, oblong-oval, 2—4.5 cm long and 1—2 cm broad, obtuse, mucronate, the petiolules 1—2 mm long; flowers numerous, large, inodorous; pedicels rather long; racemes mostly dense, erect, 5—10 cm long and 4.5 cm broad, shorter than leaves; corolla reddish white; calyx 7 mm long and 4—5 mm broad, with elongated acute teeth; standard 1.8 cm long and 1.5 cm broad, about equaling wings and keel; wings oblong, obtusely auricled at base; keel obtuse; ovary glabrous, the filiform style short-hairy at summit; pod oblong-linear, 5.5—7 cm long and 7—9 mm broad, flat, sparsely covered with straight glandular and simple appressed white hairs, the beak curved
310 at the end; seeds oblongly oval-reniform, 4 mm long and 2 mm broad, brown, smooth, dull. June—July.

Cultivated in parks and gardens. — European part: Bl., L. Don, Crim.; Caucasus: W. Transc. (Sochi, Khosta), E. Transc. (Tbilisi, Baku). **Gen. distr.**: N. Am. Described from North America. Type in London.

Genus 800. **EREMOSPARTON** * FISCH. et MEY. **

Fisch. et Mey. Enum. pl. nov. (1841) 75.

Flowers in long racemes; calyx campanulate, with short broadly triangular teeth; standard suborbicular, retuse; wings oblong, slightly falcate; keel curved; pod 1- or 2 (3)-seeded, membranous. Shrubs with long and apparently leafless branches, the leaves reduced to scales.

1. Pods bladdery-inflated . . . . 2.
+ Pods compressed laterally, slightly falcate . . . . 3. **E. flaccidum** Litw.
2. Pods 7—9 (10) mm long; calyx-teeth triangular. . . . . 1. **E. aphyllum** (Pall.) Fisch. et Mey.
+ Pods to 10—15 mm long; calyx-teeth elongate from triangular base . . . . 2. **E. songoricum** (Litw.) Vass.

1. **E. aphyllum** (Pall.) Fisch. et Mey. Enum. pl. nov. (1841) 76; Ldb. Fl. Ross. I, 575; Shmal'g., Fl. I, 251; Grossg., Fl. Kavk. II, 292; B. A. Fedch., Fl. Yugo-Vost. V, 583. — Spartium aphyllum Pall. Reise III (1776) Anh. 742. — Exs.: HFR No. 2403. — Ic.: Pall. l. c.; Fedch., l. c.

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* From Greek eremos — of the desert, and sparton — a Greek name of certain Mediterranean shrubs.
** Treatment by I. T. Vasil'chenko.

Shrub; stem to 1 m long, branched from base; branches numerous, long, virgate, erect; branchlets more slender, glabrate or hairy (var. puberulum B. Fedtsch.); leaves reduced to small lanceolate membranous scales, appressed to stem; flowers subtended by 2 bracteoles and a large bract, disposed singly in long loose racemes, violet; calyx pubescent, the teeth usually one-quarter to one-third as long as the tube; corolla 6–7 mm long; standard suborbicular, retuse; wings with a small lateral tooth at base; pod inflated, short-ovaloid or subovoid, light-colored, short-hairy, 7–9 (10) mm long and 5–7 mm broad, terminating in curved beak, the stipe ca. 3 mm long. May–June. (Plate XXI, Figure 1).

Sands. — European part: L. V.; Caucasus: Dag. (Kumtorkale); Centr. Asia: Ar.-Casp., Balkh. (W. part). Endemic. Described from L. V. (sands near Naryn and Saskol). Type in Leningrad.

2. **E. songoricum** (Litw.) Vass. comb. n — E. aphyllum Fisch. et Mey. var. songoricum Litw., Zam. o rast. russk. flory, Tr. Bot. Muz. Akad. Nauk XI (1913) 74.

Shrub, with numerous, slightly hairy branches and long virgate branchlets; calyx broadly campanulate, with scattered hairs; teeth subulate from triangular base, shorter than tube; corolla ca. 7 mm long; standard subreniform, retuse; wings oblong, slightly curved, with a small tooth at base; pod ovaloid, 1–3-seeded, 10–15 (18) mm long and 8–10 mm broad, inflated, membranous, at first densely hairy, in maturity with scattered hairs, terminating in a recurved beak, the stipe 3–5 mm long. May–June. (Plate XXI, Figure 8).

Sands. — Centr. Asia: Balkh. Endemic. Described from specimens collected by Schrenk, on June 6, 1840, in sands near Lake Balkhash. Type in Leningrad.

3. **E. flaccidum** Litw., Zam. o rast. russk. flory, Tr. Bot. Muz. Akad. Nauk (1913) 75. — E. aphyllum (Pall.) Fisch. et Mey. in Litw. Sched. HFR No. 458 et Litw. Pl. turcom. exs. No. 56 et No. 244.

Tree, much branched, to 5–6 m high; slender, virgate, pendulous, tomentose tomentose; leaves reduced to small lance-linear acute appressed scales to 4 mm long; flowers to 6–7 mm long, dark violet, scattered; each flower subtended by a narrow acute scarious bract about the length of calyx-tube and a pair of very small setaceous caducous bracteoles; calyx campanulate, 4–5 mm long, the lanceolate teeth shorter than the tube; standard reniform, emarginate; wings oblong-falcate; keel curved; pod to 10–12 mm long and to 7–9 mm broad, compressed laterally, semiterete, convex and apparently winged on one side, slightly thickened and but slightly convex on the other, light-colored, tomentose, terminating in a falcate beak; seeds short-oval, compressed laterally, with a round hilum. April–May; fr. May–June. (Plate XXI, Figures 6, 7).

Barkhan sands. — Centr. Asia: Kara K., Kyz. K. Endemic. Described from Repetek. Type in Leningrad.

Note. As for specimens of this species in which the pods are much elongated and strongly curved at summit (appearing falcate throughout), I refer them to a new form of this species — f. falcatum m.

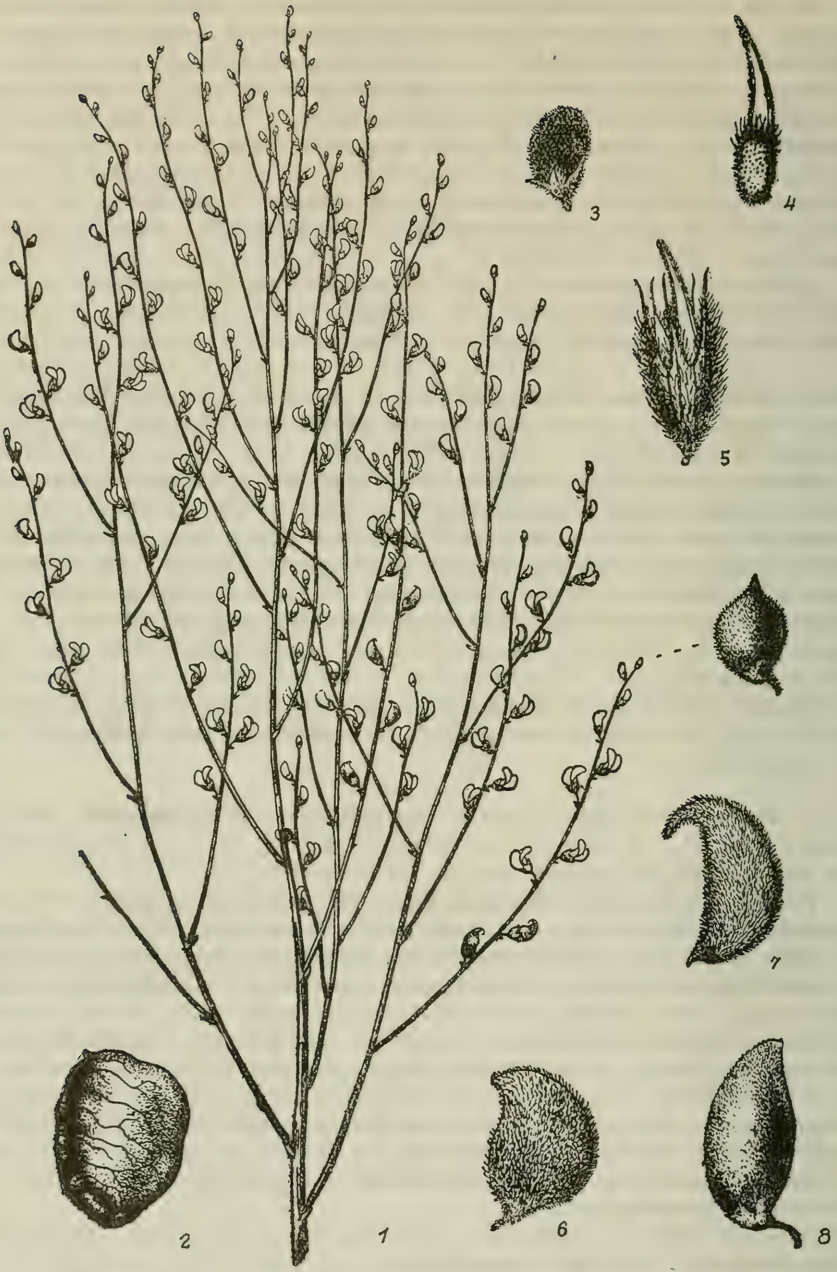

PLATE XXI. 1 – Eremosparton aphyllum (Pall.) Fisch. et Mey., general aspect and pod; 2 – smirnovia turkestana Bge., pod; 3 – Psoralea drupacea Bge., pod; 4 – P.bituminosa L., pod; 5 – P.acaulis Stev., pod with calyx; 6 – Eremosparton flaccidum Litw., pod; 7 – E.flaccidum f.falcatum Vass., pod; 8 – E.songoricum (Litw.) Vass., pod.

Genus 801. **SPHAEROPHYSA*** DC.**

DC. Mem. sur la fam. des Legum. (1825) 288.

Calyx campanulate, 5-toothed; standard suborbicular; wings falcate-oblong; keel incurved, obtuse; stamens diadelphous; ovary stipitate, many-ovuled; style curved, bearded along the upper part; pod scarious, globose, inflated, indehiscent. Perennial plants with imparipinnate leaves.

1. **S. salsula** (Pall.) DC. Prodr. II (1825) 271; Ldb. Fl. Alt. IV, 336; Ldb. Fl. Ross. I, 574; Boiss. Fl. or. II, 197; Kryl., Fl. Zap. Sib. VII, 1615. — Phaca salsula Pall. Reise III (1776) 216, 425, Anhang 747. — Colutea caspica M. B. Fl. taur.-cauc. II (1808) 169. — Swainsona salsula Taubert in Engl. u. Prantl Nat. Pflzfam. II, 2 (1891) 281; Fedch., Rast. Turk. 512; Grossg., Fl. Kavk. II, 292. — Ic.: Pall., l. c., tab. B. b., f. 1, 2; Trautv. Pl. Imag. et Descr. Fl. Ross. tab. 33. — Exs.: HFR No. 613; Fl. Cauc. Exs. No. 210. Vernacular name: buyan (Kazak, according to Berg).

Perennial, clothed with scattered short appressed hairs (leaves glabrous above); stems erect, 30—70 cm long, with appressed branches; stipules lanceolate, acute, 2 mm long; leaves imparipinnate, 4—9.5 cm long; leaves 6—10 pairs, elliptic to oblong-oval, obtuse, mucronulate, 5—15 mm long and 2—7 mm broad, the petiole 0.6 mm long; flowers numerous, short-pediceled; racemes terminal, oblong, 4—10 cm long and 2—2.5 cm broad, equaling or exceeding leaves; bracts lanceolate, acute, shorter than pedicel; calyx 4—5 mm long and 2—3 mm broad; teeth short, broadly triangular, acute; corolla red; standard orbicular, retuse, 1.3—1.5 cm long and 1 cm broad; wings falcate-oblong, curved, 1.4 cm long, about equaling keel, with oblong auricles; ovary covered with short appressed hairs; pod stipitate, glabrous or with scattered hairs, rounded-oblong to globose, nodding, 1-locular, 2.5—3.5 cm long and 1.8—2 cm broad; seeds 1.5 mm long, rounded-reniform, brown, smooth, dull. April—August.

Loess, sandy, solonetz, and solonchak steppes, hummocky sands, coastal solonetzes, and puffic solonchaks, solonetz meadows, saline clayey riversides, gardens, cotton fields, borders of rice fields, irrigation ditches, and alfalfa fields. — Caucasus: Dag., E. Transc.; W. Siberia: Irt.; E. Siberia: Dau.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K., Amu D., Syr D., Pam.—Al., T. Sh. **Gen. distr.**: Dzu.-Kash., Mong. (N.), Jap.-Ch. (N. China). Described from the shore of Lake Torei in Dauria. Type in Leningrad.

Genus 802. **SMIRNOVIA** † BGE.††

Bge. in A. H. P. V (1876) 339

Flowers in loose racemes; calyx white-tomentose, 5-toothed; corolla lilac or white, with rounded-reniform standard and obtuse keel with incurved tip; pod large, ovaloid, bladdery-inflated, with thin apparently membranous walls; seeds numerous, reniform. Shrubs with long slender virgate white-pubescent stems and simple or rarely 3-foliolate summer-deciduous leaves.

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* From Greek spaira — sphere, and physa — bladder, alluding to the inflated globose pod.

** Treatment by S. G. Gorshkova.

† Named for Smirnov, who first found this plant in the Kyzyl-Kum Desert.

†† Treatment by I. T. Vasil'chenko.

1. **S. turkestana** Bge. l. c. — Eremosparton turkestanicum Franchet in Ann. Sc. Nat. VI sér., tab. XV (1883) 252. — Exs.: No. 712 sub Eremosparton; Ed. Hort. Bot. Petrop. No. 37.

Shrub, to 1 m high, with long, erect branches and numerous slender, densely white-pubescent branchlets; leaves simple or 3-foliolate; leaflets obovate, retuse, densely hairy to almost tomentose beneath; flowers in loose axillary racemes; calyx tomentose, the lance-triangular teeth shorter than the tube, two teeth longer than the rest; corolla lilac, rarely white, ca. 15 mm long; standard subreniform-orbicular, retuse; keel incurved at tip, obtuse; wings oval, slightly dilated at the ends, subfalcate; pod bladdery, ovaloid, to 5 cm long, finely cross-nerved, puberulent, short-stipitate; seeds reniform ca. 5 mm long, compressed laterally, with a round hilum; some of the ovules usually abortive. April—May; fr. from June. (Plate XXI, Figure 2).

Sands. — Centr. Asia: Kara K., Kyz. K. Endemic. Described from the Kyzyl-Kum Desert. Type in Leningrad.

Genus 803. **COLUTEA** * L. **

Fisch. ex DC. Mem. sur Legum. (1825) 283.— Halodendron DC. Prodr. II (1825) 269.

Inflorescence an axillary raceme, about equaling the leaves; bracts minute; bracteoles at base of calyx, minute, sometimes wanting; calyx broad
316 tubular or campanulate, covered with short appressed black and white hairs; calyx-teeth subequal or the upper 2 shorter; corolla yellow or purple, several times as long as calyx, the claws of keel two or three times as long, the other claws about equaling calyx; standard suborbicular, obtuse or retuse erect, with two callosities or protuberances above the claw; wings oblong-falcate or incurved at a right angle; keel broad, auriculate at base, tapering to almost beaked; stamens diadelphous, the staminal tube obliquely truncate; ovary distinctly stipitate, many-ovuled; style bearded ventrally in upper part, strongly hooked at summit; pod membranous or coriaceous, inflated, indehiscent or sometimes open at apex, slightly incurved along ventral suture and often inverted in maturity; seeds numerous, reniform, with filiform funicle. Shrubs with alternate imparipinnate leaves (in some species the internodes of young branchlets are so short that the leaves are apparently fascicled). Russian name: puzyrnik [from puzyr, bladder].

Colutea cordata Krysht. in Upper Cretaceous layers of the Amur region (Tsagayan). — Colutea sp. in Tertiary layers of V.-Don (Tim).

Economic importance. C. orientalis Mill. and C. arborescens L., as well as a large number of their hybrids, are cultivated for ornament. Studies are being conducted to determine the possible use of Caucasian species for their laxative action and of Central Asian species for their bast fiber.

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* Plant name used by Theophrastus, from Greek coluteon — to shorten, clip. Bubani maintains, however, that Theophrastus had in mind an altogether different plant.

** Treatment by K. K. Sharapenko.

1. Flowers orange-red or purple; wings much shorter than keel* . . . . 2.
+ Flowers yellow; wings longer or but slightly shorter than keel . . . . 3.
2. Leaflets orbicular or suborbicular . . . . 1. **C. orientalis** Mill.
+ Leaflets oblong or oval . . . . 2. **C. acutifolia** Shap.
3. Leaflets oblong or oval . . . . 4.
+ Leaflets orbicular or suborbicular . . . . 5.
4. Wings equaling or slightly shorter than keel . . . . 3. **C. arborescens** L.
+ Wings longer than keel . . . . 4. **C. cilicica** Boiss. et Bal.
5. Ovary glabrous . . . . 6.
+ Ovary pubescent . . . . 7.
6. Leaflets 3, rarely 5. . . . . 5. **C. kopetdaghensis** B. Fedtsch.
+ Leaflets at least 7 . . . . 6. **C. jarmolenkoi** Shap.
7. Calyx-teeth not more than one-tenth to one-fifth as long as tube, broad . . . . 8.
+ Calyx-teeth one third to one half as long as tube, narrow, acute. . . . . 10.
8. Keel slightly beaked; leaflets 6–11 mm long and 9–15 mm broad; flowers 21–22 mm long** . . . . 7. **C. buhsei** (Boiss.) Shap.
+ Keel beakless . . . . 9.
9. Leaflets 2–6 mm long and 3–7 mm broad; flowers 14–16 mm long . . . . 8. **C. gracilis** Freyn et Sint.
Leaflets 12–15 mm long and 12–17 mm broad; flowers 18–20 mm long . . . . 9. **C. armena** Boiss. et Huet.
10. Leaflets whitish beneath with dense short appressed hairs . . . . 10. **C. canescens** Shap.
+ Leaflets green beneath, with sparse short appressed hairs . . . . . . 11.
11. Keel short-beaked . . . . 11. **C. paulsenii** Freyn et Sint.
+ Keel beakless . . . . 12. **C. hybrida** Shap.

1. **C. orientalis** Mill. Gard. Dict. ed. 8 (1768) No. 3; Lam. Encycl. I (1783) 353. – C. aperta Moench Verz. (1785) 24. – C. cruenta Dryand ex Ait. Hort. Kew. ed. 1, III (1789) 55; Boiss. Fl. Or. II (1872) 195; Shmal'g., Fl. I (1895) 251; Grossg., Fl. Kavk. II, 292. – C. sanguinea Pall. Fl. Ross. II (1790) 88. – C. purpurea Hort. ex Lavallée, Arb. segrez. (1877) 63. – Ic.: Lam. III, III (1823) t. 624, f. 3.

Shrub; leaves 5–6 cm long; leaflets 3 or 4 pairs, orbicular, cuneate at base, truncate or retuse, 11–18 mm long and 9–13 mm broad, glabrous above, sparsely covered beneath with short appressed hairs; inflorescence a 3- or 4- (rarely 5)-flowered raceme, 5–6 cm long; flowers 11–12 mm long, orange-red; pedicels 5 mm long, sparsely hairy; calyx broadly campanulate, 5–6 mm long, with throat 5–6 mm, the acute teeth nearly two-thirds as long as the tube; wings shorter than keel, flat, falcate; keel truncate, short-beaked; ovary glabrous; pod 4 cm long and 17–20 mm broad, with stipe 2–4 mm long or sometimes subsessile, glabrous, the ventral suture sometimes recurved almost at a right angle and hence the pod characteristically beaked, readily dehiscent in maturity along the ventral suture. May–August. (Plate XXII, Figure 3).

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* C. komarovii Takht., No. 13, has not been included in the key, because of lack of sufficient information concerning this species and its doubtful position within the system.

** Flower length was measured in each case from base of calyx to tip of keel.

Rocky places. – European part: Crim.; Caucasus: E. and S. Transc., Dag. Endemic. Described from a cultivated specimen. Type in London.

Note. In the Herbarium of the Komarov Institute there are a few specimens of C. orientalis Mill., collected by Léman beside the Fon River in Karatau (quoted by Boiss. Fl. Or. II, p. 195, under the name C. cruenta) and one specimen collected by O. Fedchenko in the mountains of Dashty-Kaza. Although various investigators worked subsequently in this region, nobody has seen this species again. We therefore leave the question of occurrence of this species in Zeravshan open until elucidated by future investigation.

2. **C. acutifolia** Shap. sp. nova in Addenda X, p. 294.

Shrub; leaves 6 cm long; leaflets 4 or 5 pairs, oval or oblong, acute, mucronate, 14–15 mm long and 5–7 mm broad, thin, sparsely hairy beneath, glabrous above; inflorescence a 3–5-flowered raceme 5–5.5 cm long; flowers orange-red, 12–13 mm long; calyx campanulate, 5 mm long, with throat 4–5 mm, covered with scattered black hairs, the teeth as long as the tube; wings half as long as keel, flat, bent at an angle of 130°, rounded at the flexure; keel rounded at apex, beakless; ovary glabrous; pod glabrous, ca. 5 cm long and 2 cm broad, with exserted stipe 8–9 mm long, the ventral suture less incurved than the dorsal, hence the beak usually upturned. Fl. and fr. June–July.

Caucasus: W. Transc. Endemic. Described from the Psezuape River. Type in Leningrad.

3. ★**C. arborescens** L. Sp. pl. (1753) 723; Willd. Sp. III (1800) 1139; Aschers. u. Graebn. Syn. VI, 2 (1909) 729. – Ic.: Rchb. Ic. 22 (1870) tab. 1192, f. 1., 1–20. – Exs.: Kickxia Belgica No. 357; Hohenack. Arzn. u. Handelspfl. No. 417; Baenitz, Herb. Europ. No. 8801 (sub nom. C. melanocalyx Boiss.) Fl. Hung exs. No. 244; Fl. exs. Rhenana No. 22.

Shrub to 4 m high; leaves 6–15 cm long; leaflets 3–5 or rarely 6 pairs, oval, rarely broad-oval or obovate, obtuse, truncate or retuse, 30 mm long and 15 mm broad, glabrous above, sparsely appressed-hairy beneath; inflorescence a 3–6-flowered raceme 4–5 cm long; flowers 20 mm long, bright sulfureous, the standard with reddish-brown markings; pedicel ca. 10 mm long, sparsely pubescent; calyx campanulate, 8 mm long, with throat ca. 6–8 mm, the acute teeth to one-third as long as the tube; wings shorter than to as long as keel, flat, bent at an angle of 160–170°, rounded at
319 the flexure; keel truncate, beakless; ovary mostly glabrous; pod 5–6 cm long and 2–3 cm broad, distinctly stipitate. Fl. May–August; fr. August–September.

Wood margins and scrub, on slopes. In the USSR only cultivated, in gardens and parks in the central and southern regions of the European part and in Central Asia. **Gen. distr.:** Centr. and Atl. Eur., W. Med., Bal.-As. Min., NW Afr. Described from Austria. Type in London.

C. arborescens L. × C. orientalis K. Koch, Dendrol. I (1869) 64; C. K. Schn. Laubholzk. II (1912) 89; Aschers. u. Graebn. Synop. VI, 2 (1909) 733. – C. media Willd. Enum. Hort. Berol. (1809) 771.1 C. arborescens × cruenta Dippel, Handb. Laubholzk. III (1893) 703.*

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* C. rubra Medik., Beobacht. (1783) 359, probably belongs here.

Shrub of lower growth, than C. arborescens with bluish-green leaves, smaller and darker flowers, and partly open pod with sometimes recurved beak. The features distinguishing this hybrid from C. orientalis are larger size, numerous, larger, thin, more distinctly veined leaflets, and lighter corolla. Very variable, approaching one parental species. Both parents hybridize easily in cultivation. Repeated back-crossing apparently frequent. Fl. from May to fall.

With or without the parental species, along roadsides and fences. Apparently escaping more often than C. orientalis. Occasionally cultivated in the South. Caucasus: Cisc. (Kislovodsk, Pyatigorsk); Centr. Asia: Syr D. (Tashkent). **Gen. distr.:** Centr. and S. Eur., China.

4. **C. cilicica** Boiss. et Bal. Diagn. sér. 2, V (1856) 83; Fl. Or. II (1872) 195. — C. arborescens Schmalh., Fl. I (1895) 251 p.p., non L. — C. arborescens Grossh., Fl. Kavk. II, 292 p.p., non L. — C. arborescens β melanotricha Freyn in sched. — Exs.: Kotschy, It. cilic. -hard. (1859) No. 117; Bornm. Pl. Anat. Or. (1890) No. 2696 (sub nom. C. melanocalyx).

Shrub; leaves 6—9 cm long; leaflets 3 or 4 pairs, oval, obtuse, mucronate, 16—20 or rarely to 27 mm long and 9—11 or rarely to 16 mm broad; inflorescence a 4—7-flowered raceme 5—6 cm long; flowers 20—23 mm long, yellow; pedicel 8—10 mm long, hairy; calyx tubular, 7—9 mm long, sparsely covered with short black hairs, the throat to 5—6 mm the teeth broadly triangular; wings much longer than keel, twisted at tips and bent at an angle of about 100°, distinctly spurred at the flexure; keel truncate, beakless; ovary glabrous; pod 5—6 cm long and 20—25 mm broad, with strongly exserted stipe 5—10 mm long, glabrous, the ventral suture almost straight, the dorsal strongly convex and gradually upcurved at the end. May—August. (Plate XXII, Figure 5).

Mountain slopes. — European part: Crim.; Caucasus: W. and E. Transc. **Gen. distr.:** As. Min. Described from Cilicia. Type in Geneva; cotype in Leningrad.

5. **C. kopetdaghensis** B. Fedtsch. nom. nov.; cfr. Journ. Bot. URSS XXII, 2 (1937) 183.

Shrub, to 1.5 m high; leaves 3—4 cm long; leaflets 1 pair, rarely 2 pairs, rounded-obovate, truncate or retuse, 12—15 mm long and 7—8 mm broad; inflorescence a 3—5-flowered raceme ca. 5 cm long; flowers 14—15 mm long; standard yellow; keel purple; pedicel 5—6 mm long, sparsely hairy; calyx tubular-campanulate, 6—7 mm long, rarely black-hairy, with throat 5—6 mm, the teeth one-third as long as the tube; wings shorter than keel, flat, twisted at the end, bent at an angle of 100—130°, minutely spurred at the flexure; keel emarginate, distinctly beaked; ovary glabrous; pod smaller than that of C. buhsei, stipitate, glabrous. May.

Gravelly taluses on gully slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kopet Dagh. Type in Leningrad.

6. **C. jarmolenkoi** Shap. sp. nova in Addenda X, p. 294.

Shrub; leaves 7—8 cm long; leaflets 3 or rarely 4 pairs, orbicular, truncate or retuse, 15—25 mm long and 10—20 mm broad, glabrous, almost smooth; inflorescence a 4-flowered raceme, 6—7 cm long; flowers yellow; calyx tubular-camapanulate, 7 mm long, with throat to 6 mm, the acute teeth about half as long as the tube; wings shorter than to equaling keel, flat, bent at an angle of 130°, rounded at the flexure; keel trunctate, obsoletely beaked; ovary glabrous; pod 5—5.5 cm long and 2.5—3 cm broad, subsessile, glabrous. Fl. and fr. May—August. (Plate XXII, Figure 4).

Stony foothill slopes, valleys, and irrigation canals. — Centr. Asia: Pam.-Al., Syr D. Endemic. Described from Fergana. Type in Leningrad.

7. **C. buhsei** (Boiss.) Shap. comb. nova. — C. persica var. Buhsei Boiss. Fl. Or. II (1872) 196. — Exs.: P. Sintenis It. transcasp.-pers. (1900–1901) No. 724 (sub nom. C. persica var. buhsei).

Shrub; leaves 7–8 cm long, disposed on the stem in fascicles of 4–8; leaflets 3 or 4 pairs, orbicular, rounded-oval, or obovate, truncate or retuse or emarginate, 6–11 mm long; inflorescence a 2- or 3- (rarely 4)-flowered raceme, 8–9 cm long; flowers 21–22 mm long, orange-yellow; pedicel 10–15 mm long, sparingly hairy; calyx broadly tubular, 7–8 mm long, sparingly black-hairy, with throat 8–9 mm, the teeth short and broad; wings longer than keel, flat, bent at an angle of 100°, minutely spurred at the flexure; keel emarginate, beaked within the notch and hence beak apparently
321 longer; ovary hairy; pod 5.5–6 cm long and 21–23 mm broad, sparingly hairy, with strongly incurved dorsal suture, the short stipe scarcely exserted Fl. April–July. (Plate XXII, Figure 1).

Mountain slopes and gullies. — Centr. Asia: Mtn. Turkm. **Gen. distr.**: N. Iran. Described from N. Iran. Cotype in Leningrad.

8. **C. gracilis** Freyn et Sint. ex Freyn in Bull. Herb. Boiss. sér. II, 4 (1904) 46. — Exs.: P. Sintenis, It. trancasp.-pers. 1900–1901, No. 1705.

Shrub; leaves 3–5 cm, mostly disposed on stem in fascicles of 4–16; leaflets 4 or rarely 5 pairs, orbicular, rounded-oval or obovate, truncate, retuse or emarginate, 3–7 mm long and 2–6 mm broad, sparingly covered with short appressed hairs; inflorescence a 4- or 5-flowered raceme 4–5.5 cm long; flowers 14–16 mm long, light yellow; pedicel 7–10 mm long, sparingly hairy; calyx tubular-campanulate, 5 mm long, sparingly hairy, with throat 4–5 mm, the teeth short and broad; wings longer than keel, subulate, convolute, bent at a right angle, spurless, with a mostly arched shoulder; keel truncate, beakless; ovary hairy; pod 3–4 cm long and 15–20 mm broad, with a strongly incurved dorsal suture, sparingly white-hairy, the short stipe scarcely exserted. Fl. and fr. April–July. (Plate XXII, Figure 6).

Mountain slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kopet Dagh. Cotype in Leningrad.

9. **C. armena** Boiss. et Huet, Diagn. sér. 2, V (1856) 83; Fl. Or. II (1872) 194. — C. arborescens Grossh. p. p. Fl. Kavk. II (1930) 292, non L.

Shrub; leaves 7–9 cm long; leaflets 3 or 4 pairs, orbicular, cuneate at base, truncate or retuse, 12–17 mm long and 11–15 mm broad, glabrous above, sparingly covered beneath with short appressed hairs; inflorescence a 2–4-flowered raceme 6–9 cm long; flowers yellow, 18–20 mm long; pedicel 5–12 mm long, sparingly hairy; calyx campanulate, 6–8 mm long, densely covered with short white hairs, these sometimes interspersed with some black hairs, the teeth short, the throat 5–7 mm long; wings longer than keel, flat or involute, bent at an angle of 100°, spurless; keel truncate, beakless; ovary densely hairy; pod ca. 9 cm long and 20–25 cm broad, sparingly appressed appressed-hairy, the ventral suture usually less incurved than the dorsal, hence the beak commonly upturned; stipe 6–8 mm long, slightly exserted. Fl. May-August. (Plate XXII, Figure 2).

Stony slopes. — Caucasus: E. Transc. **Gen. distr.**: Arm.-Kurd. Described from Erzerum. Type in Geneva.

10. **C. canescens** Shap. sp. nova in Addenda X, p. 394. — C. persica Borissova (non Boiss.) pro min. parte in Fl. Tadzhik. V (1937) 219.

Shrub, ca. 2 m high; leaves 2—9 cm long; leaflets 4 pairs, orbicular, truncate or retuse, cuneate at base, 9—12 mm long and 7—9 mm broad, densely white-hairy beneath, appressed-hairy above; inflorescence a 3- or 4-flowered raceme to 9 cm long; flowers yellow, 17—18 mm long; pedicel 7—10 mm long, densely pubescent; calyx broadly tubular, 8 mm long, with throat to 7 mm, the acute teeth half as long as the tube; wings longer than keel, flat, bent at a right angle, rounded at the flexure; keel truncate, short-beaked; ovary densely hairy; pod 5 cm long and 17 mm broad, sparingly hairy; stipe to 10—12 mm long, 2—2.5 times the length of calyx. August.

Mountain slopes, exposed and dry places, clayey and stony soils. — Centr. Asia: Pam.-Al. Endemic. Described from the Gissar Range. Type in Leningrad.

11. **C. paulsenii** Freyn et Sint ex Freyn in Bull. Herb. Boiss. sér, 2, IV (1904) 46. — C. persica Borissova (non Boiss.) pro max. parte in Fl. Tadzhik. V (1937) 219. — Ic.: Fl. Tadzhik. V (1937) tab. 19 (sub nom. C. persica).

Shrub; leaves 6—9 cm long; leaflets 3 or rarely 4 pairs, orbicular, obtuse or retuse, 10—13 mm long and 6—12 mm broad, sparingly hairy, coarsely rugose; inflorescence a 3—5-flowered raceme 4—10 cm long; flowers 17—18 mm long, orange; pedicel ca. 10 mm long, hairy; calyx tubular-campanulate, 10 mm long, sparingly covered with black and white hairs, with throat to 8 mm, the teeth long and acute; wings equaling or exceeding keel, flat or slightly convolute at tips, bent at a right angle, rounded at the flexure; keel truncate, beaked; ovary silvery-pubescent; pod 7—9 cm long and 25—35 mm broad, sparingly hairy; stipe to 10 mm long, twice or more times the length of calyx. Fl. and fr. May—October. (Plate XXII, Figure 7).

Slopes of mountains and gullies, foothills, and up to the middle mountain zone. — Centr. Asia: Pam.-Al. **Gen. distr.**: Iran. (Afghanistan). Described from the Pamir. Type in Geneva.

Note. As we know the type of C. paulsenii from an incomplete specimen (a leaf and fruit without calyx), and the herbarium material that we have studied displays very great variability, it remains for future investigators to make a thorough study of the forms included by us under this name and to check the correctness of their inclusion in C. paulsenii.

12. **C. hybrida** Shap. sp. nova in Addenda X, p. 295. — C. persica borissova (non Boiss.) pro min. parte in Fl. Tadzhik. V (1937) 219.

Shrub; leaves 3—4 cm, disposed on the stem in twos or threes; leaflets 2 or 3 pairs, orbicular or broadly obovate truncate or retuse, cuneate at base, 5—10 mm long and 4—8 mm broad, with short appressed hairs beneath, glabrate above, rugulose; inflorescence a 2- or 3-flowered raceme 4—6 cm long; flowers yellow, 20 mm long; calyx campanulate, 6—7 mm long, with throat 6—7 mm, the teeth up to half as long as the tube; wings exceeding keel, flat, bent at an angle of 100°, rounded at the flexure; keel truncate or obtuse, beakless; standard reddish toward base, with two conspicuous pale yellow spots just above the claw; ovary densely hairy; pod ca. 6 cm long and 25 mm broad, the stipe twice the length of calyx. May.

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Gissar Range. Type in Leningrad.

13. **C. komarovii** Takht. in Not. Syst. Inst. Bot. Tphilis. 9 (1940) 22.

Shrub; leaves 7–12 mm long; leaflets 1 or rarely 2 pairs, orbicular or rounded-oval, rounded or obtuse at apex, 4–5 mm long and 3–4 mm broad, with scattered appressed hairs, thick, rugulose; flowers unknown; fruiting calyx campanulate, with scattered white hairs, the throat 3–4 mm, the teeth long and acute; pod dull, glabrous, 1.7–2.2 cm long and 1.2–1.5 cm broad, the stipe 1.5 times to twice the length of calyx; branches with smooth bark and short spinescent branchlets. Fr. June.

Caucasus: S. Transc. Endemic. Described from the Nakhichevan ASSR. Type in Leningrad.

Genus 804. **HALIMODENDRON**[*] FISCH.[**]

Fisch. ex DC. Mem. sur Legum. (1825) 283.– Halodendron DC. Prodr. II (1825) 269.

Calyx urceolate-campanulate, with rather short teeth; standard suborbicular with reflexed margins; wings and keel falcate-oblong, obtuse, about equaling standard; ovary stipitate, glabrous; style filiform; pod obovoid or oblong-obovoid, stipitate, coriaceous, strongly inflated, channeled along sutures, few-seeded; seeds subreniform oval, rather smooth, slightly flattened. Spiny shrubs with paripinnate leaves. Russian name: chingil'.

1. **H. halodendron** (Pall.) Voss. in Vilm. Ill. Blumeng. 3 Aufl. (1896) 215; Kryl., Fl. Zap. Sib. VII, 1616. – Robinia Halodendron Pall. Reise durch versch. Prov. des Russ. II (1770) Anh. 741; L. fil. Suppl. (1781) 330. – Caragana argentea Lam. Encycl. method. I (1783) 616. – Halimodendron argenteum DC. Prodr. II (1825) 269; Ldb. Fl. Alt. III, 267; Ej. Fl. Ross. I, 572; Boiss. Fl. Or. II, 198; Grossg., Fl. Kavk. II, 293. – H. triflorum Willd. ex Link, Handb. II (1831) 201. – H. subvirescens G. Don, Gen. Syst. II (1832) 244. – H. cuspidatum Jaub. et Spach in Ann. Sc. Nat. ser. II, XVIII 324 (1842) 239. – H. emarginatum Jaub. et Spach, l. c. 299. – H. speciosum Carr. in Rev. Hortic. (1876) 30. – Ic.: Pall. Reise l. c. tab. W; Pall. Fl. Ross. I, p. 1, tab. XLVI; Schneider, Dendrol. Winterst., 71; Malpighia, XXI, 93; Silva Tarouca, Freiland-Laubgehölze, 230; L. H. Bailey, Stand. Cycl. Hort., 1429. – Exs.: HFR No. 663; Edit. H. B. P. No. 76.

Shrub, 0.5–2 m high, with fuscous-brown bark, covered with short silky canescent-silvery appressed hairs (var. vulgare DC.) or glabrous (var. subvirescens DC.); spines 2–6 cm long; leaves paripinnate, 3–3.5 cm long, with 1–5 pairs of leaflets and a terminal spine 1–3 mm long; stipules 2, subulate or triangular, 1–2 mm long, spinescent; leaflets obcuneate or oblong-obovate, 1.5–3.5 cm long and 2.5–11 mm broad, emarginate, with a mucro 0.5–1 mm long; flowers pedicellate, in twos or threes; racemes 3–4.5 cm long and 3–4 cm broad, on axillary peduncles; calyx 3–6 mm long and 3–5 mm broad, the teeth broadly triangular; bracteoles paired, at base of calyx or on upper part of pedicel, 0.5 mm long; corolla violet or almost white; standard 1.5 cm long and 1.3 mm broad, mostly retuse, with a short cuneate claw, about equaling wings and longer than claw; wings with an oblong-linear auricle 2–5 mm long; keel incurved; pod glabrous, rugose,

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[*] From Greek hals – saline, and dendron – tree.

[**] Treatment by S. G. Gorshkova.

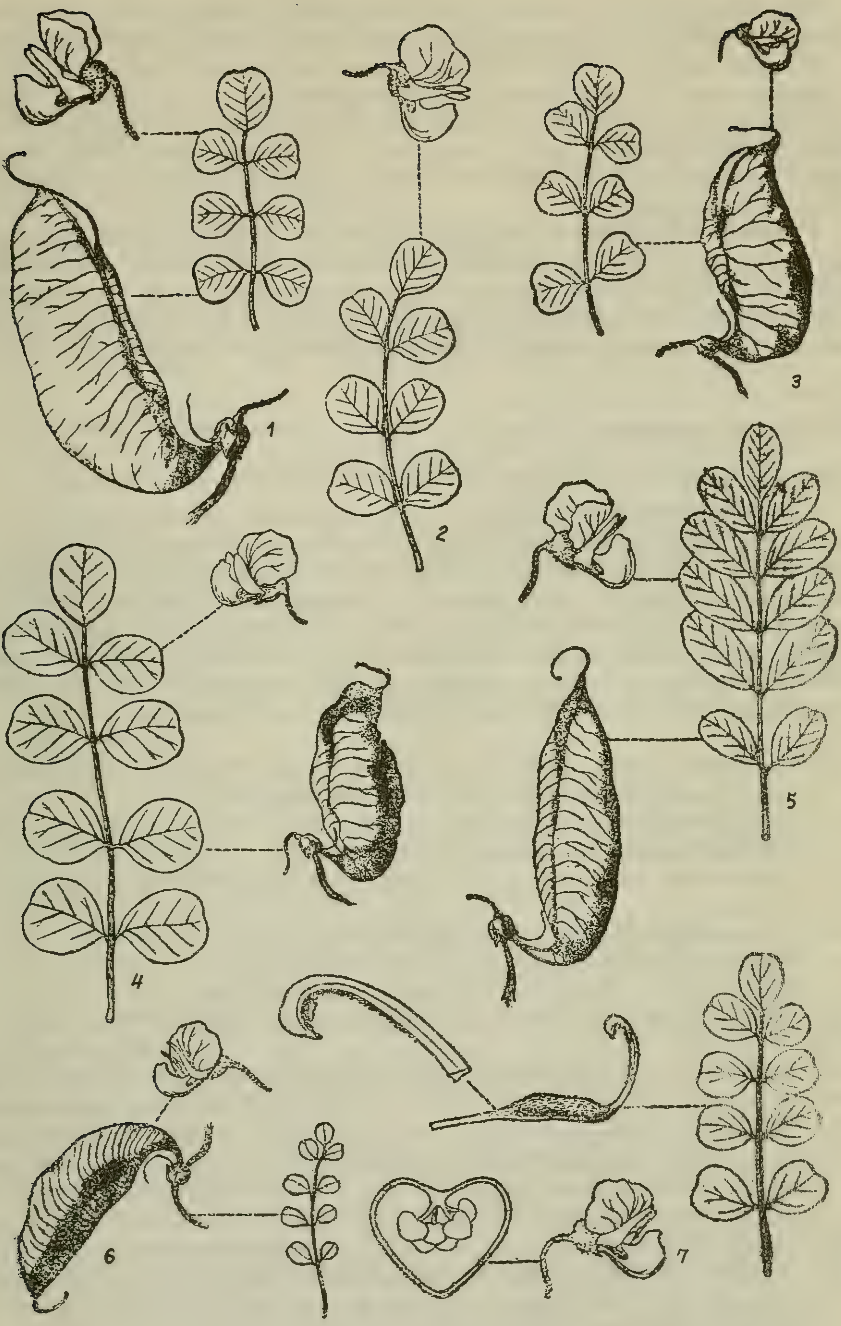

PLATE XXII. 1 — Colutea buhsei (Boiss.) Shap., pod, leaf, flower; 2 — C. armena Boiss. et Huet, leaf, flower; 3 — C. orientalis Mill., pod, leaf, flower; 4 — C. jarmolenkoi Shap., leaf, pod, flower; 5 — C. cilica Boiss. et Bal., pod flower; 6 — C. gracilis Freyn et Sint., pod leaf, flower; 7 — C. paulsenii Freyn et Sint., leaf, ovary, style, flower, pod in section.

1–3 cm long and 0.7–1.2 cm broad, with a short curved beak; seeds reniform, smooth, brown, 2.5–3 mm long and 2 mm broad. June. (Plate XX, Figure 2).

Steppes, sandy desert sites, solonchaks, coastal and flatland tugai. – European part: L. Don (vicinity of Novocherkassk); Caucasus: E. Transc.; W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Iran., Mong. (NW). Described from the banks of the Irtysh River, near Yamysheva. Type in Leningrad.

Economic importance. Suitable for individual or group planting in dry parts of parks, also for borders and hedges (V. P. Drobov). On its own roots salt-tree fares very badly in the climatic conditions of the Voronezh and Kursk regions, but grafted on Siberian pea-tree it develops satisfactorily and sets fruit even in Moscow (Kh. Isachenko and V. Popov).

327 Genus 805. **CARAGANA** * LAM. **

Encycl. meth. I (1785) 615; Kom., Monogr. in A.H.P. XXIX, 2 (1909) 199.

Corolla yellow, rarely white or pink; standard clawed, oboval to orbicular; wings elongated, obliquely truncate; keel obtuse or acute; stamens diadelpous; ovary subsessile, containing several ovules; pod mostly sessile; seeds oblate-ovaloid; calyx tubular or campanulate. Shrubs or very rarely small trees, with alternate paripinnate leaves (leaflet pairs sometimes so closely approximate at base that leaves are apparently digitate); leaflets 2–10 pairs; rachis often becoming lignified and transformed into a spine; stipules membranous or becoming indurated and spinescent.

1. Leaflets of all leaves closely approximate at base, hence apparently in a flabellate fascicle (leaves pseudo-digitate) . . . . 2.
+ All leaves distinctly pinnate or only those of long shoots while those of short shoots are pseudo-digitate . . . . 17.
2. Calyx-tube long and narrow, gibbous at base (Series Grandiflorae) . . . . 3.
+ Calyx-tube shorter and broader, not gibbous . . . . 6.
3. Calyx 12–16 mm long; corolla 26–32 mm long . . . . 4.
+ Calyx 8.5–11.5 mm long; corolla 17–24 mm long . . . . 5.
4. Calyx-teeth narrowly triangular, long-acuminate, 4–5 mm long . . . . 7. C. grandiflora (M. B.) DC
+ Calyx-teeth broadly triangular, obtusish, or acute, 2.5–3.5 mm long . . . . 10. **C. kirghisorum** Pojark.
5. Shoots very slender (0.4–1 mm in diameter), without corky stripes, practically unarmed (the few spinules being very short and slender); calyx-teeth ca. 3 mm long . . . . 8. **C. scythica** (Kom.) Pojark.
+ Shoots much stouter, conspicuously corky-striped, very spiny; calyx-teeth 1.5–2 (2.5) mm long . . . . . . 9. **C. balchaschensis** (Kom.) Pojark.
6. Leaflets of axillary shoots digitately disposed on a distinct petiole, oboval, 1.5–3 (4) times as long as broad; calyx gibbous at base (Series Frutescentes) . . . . 7.

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* Kirghiz "black ear," believed to allude to black-eared foxes hiding in Caragana thickets.

** Treatment by A. I. Poyarkova.

+ Leaflets of axillary shoots fascicled, without any common petiole, linear or narrowly lanceolate, 4–10 times as long as broad (only in C. alaica 2.5–4 times); calyx not gibbous (Series Pygmaeae). . . . . 11.

7. Leaflets, calyx, ovary, and other plant parts grayish with dense soft pubescence . . . . 3. **C. mollis** (DC). Bess.

+ Leaflets and ovary glabrous or sparsely appressed-hairy; only ovary densely appressed-hairy . . . . 8.

8. Ovary densely appressed-hairy; calyx broadly tubular, the large spinous-tipped teeth one-third the length of tube . . . . 4. **C. camilli-schneideri** Kom.

+ Ovary glabrous or sparsely hairy; calyx narrower, the broad teeth one sixth to one quarter the length of tube . . . . 9.

9. Corolla 25–35 mm long; calyx tubular; shoots strongly spinose . . . . 5. **C. laeta** Kom.

+ Corolla 16–25 mm long . . . . 10.

10. Pedicels as long as or slightly longer than calyx; calyx tubular; bark golden-brown or yellowish brown; shoots strongly spinose . . . . 6. **C. turfanensis** (Krassn.) Kom.

+ Pedicels 2–4 times as long as calyx; calyx campanulate-tubular bark grayish brown; shoots mostly unarmed (though sometimes strongly spinose) . . . . 2. **C. frutex** (L.) C. Koch.

11. Pedicels usually exceeding leaves; leaflets oboval, 2.5–4 times as long as broad, cuneate at base; auricle of wings (one-fifth) one-quarter to one-third as long as limb . . . . 17. **C. alaica** Pojark.

+ Pedicels always shorter than leaves; leaflets 4–8 (12) times as long as broad . . . . 12.

12. Leaflets falcate, mostly convolute or twisted; calyx campanulate; auricle of wing about equaling the claw; bark dark . . . . 16. **C. aurantiaca** Koehne.

+ Leaflets straight; calyx broader, tubular or campanulate-tubular; auricle of wing shorter . . . . 13.

13. Bark of branches pale yellow or bright golden . . . . 14.

+ Bark of branches dark, brownish gray or greenish gray . . . . 15.

14. Bark pale yellow or whitish; leaflets narrowly oboval, commonly obtuse; calyx 5–6 mm long, tubular-campanulate; claw of wings one-third as long as limb, the auricle one-half to two-thirds as long as the claw . . . . 15. **C. leucophloea** Pojark.

+ Bark bright golden; leaflets linear to linear-obovate; calyx tubular; claw of wings two-thirds as long as limb, the auricle one-fifth to one-quarter as long as the claw . . . . 11. **C. pygmaea** (L.) DC.

15. Leaflets oboval (4–7 times as long as broad), to 19–23 mm long and 3 mm broad; claw of wings two-thirds as long as limb, the auricle one-fifth to one-quarter as long as the claw . . . . 13. **C. altaica** (Kom.) Pojark.

+ Leaflets to 12 mm long and 1.5 (2) mm broad; claw of wings shorter, the auricle longer . . . . 16.

16. Leaflets glaucescent, mostly acuminate, usually conduplicate; calyx campanulate-tubular (slightly enlarged upward); auricle of wings two-fifths to half as long as claw . . . . 12. **C. stenophylla** Pojark.

+ Leaflets dark green, more or less anthocyanin-tinged, not conduplicate, commonly obtuse; calyx tubular-campanulate (markedly enlarged upward); auricle or wings two-thirds as long as claw . . . . 14. **C. pumila** Pojark.

17. Leaf rachis persistent, spiny . . . . 18.

+ Leaf rachis deciduous . . . . 29.

18. Standard narrowly oboval; leaflets to 30–35 mm long and 15 mm broad . . . . 1. **C. ussuriensis** (Rgl.) Pojark.

+ Standard broad; leaflets to 20–25 mm long and 7 mm broad . . . . . 19.

19. Calyx 14–17 mm long, campanulate-tubular, narrowing to a conical base; corolla pink; rachises of all leaves persistent as spines to 6–7 cm long (Series Jubatae) . . . . 20.

+ Calyx 6–10 mm long or, if larger, then narrowly tubular, with a broad truncate base, and corolla yellow . . . . 21.

20. Shoots and calyx villous; leaflets 4–6 pairs, appressed-hairy; auricle of wings only two-thirds to three-quarters as long as claw . . . . 25. **C. jubata** (Pall.) Poir.

+ Shoots and calyx silky with antrorse-appressed hairs; leaflets 3 or 4 pairs, densely appressed-hairy; auricle of wings one-quarter to one-third as long as claw . . . . 26. **C. laetevirens** Pojark.

330 21. Calyx long-tubular, 9–12 or 14–21 mm long, with large narrowly triangular teeth; pod 2–2.5 times as long as broad (Series Tragacanthoides) . . . . 22.

+ Calyx tubular-campanulate, 6–10 (13) mm long, with short broad teeth; pod 7–10 times as long as broad . . . . 25.

22. Leaflets and shoots densely white-tomentose . . . . 21. **C. hololeuca** Kom.

+ Leaflets green or grayish with appressed pubescence but not tomentose . . . . 23.

23. Corolla 20–22 mm long; rachis of leaves on long shoots transformed into a thick curved spine 8–16 mm long; on short shoots partly deciduous, partly persistent as slender spines 5–12 mm long . . . . 22. **C. tragacanthoides** (Pall.) Poir.

+ Corolla 27–35 mm long; rachises of leaves on both long and short shoots persistent as spines 10–20 mm or 15–40 mm long . . . . . . 24.

24. Leaflets 2 or 3 pairs, grayish with silky pubescence, narrowly oboval; spines 10–20 mm long; corolla 27–30 mm long . . . . 23. **C. bongardiana** (F. et M.) Pojark.

+ Leaflets 4–6 pairs, green, sparsely appressed-hirsute, mostly broader; spines 15–40 mm long; corolla 30–35 mm long . . . . 24. **C. pleiophylla** (Rgl.) Pojark.

25. All leaves distinctly pinnatifid, the leaflet pairs remote . . . . 26.

+ Leaves of long shoots with remote leaflet pairs; leaflets of short shoots inserted close together and apparently fascicled . . . . 27.

26. Leaflets 10–18 mm long and 3–12 mm broad, often larger and to 23 mm long and 15 mm broad . . . . 30. **C. turkestanica** Kom.

+ Leaflets 4–9 mm long and 2–4 mm broad . . . . 27. **C. acanthophylla** Kom.

27. Standard with a broad limb, abruptly narrowing to a short claw; wings with claw one-third length of limb, the linear auricle nearly equaling the claw . . . . 18. **C. dasyphylla** Pojark.

+ Standard oboval, gradually narrowing to a claw; claw of wings as long as or longer than limb, the obtuse auricle one-fifth as long as the claw (Series Spinosae) . . . . 28.

28. Leaflets 7–23 mm long, rather sparsely appressed-hairy, narrowly oboval to sublinear; spines 15–60 mm long . . . . 19. **C. spinosa** (L.) DC.

+ Leaflets 5–10 mm long, densely pubescent on both sides, oboval; spines 10–25 mm long . . . . .20.**C. pruinosa** Kom.

29. Ovary ovaloid; pod broadly linear, three times as long as broad; leaflets 2–4 pairs, broad, thickish, with thick prominent veins . . . . 32. **C. bungei** Ldb.

+ Ovary linear; pod narrowly linear, 5–8 times as long as broad; leaflets firmly membranous, with rather inconspicuous veins . . . . 30.

30. Leaflets 5–10 pairs, to 10 mm long and 6 mm broad; calyx campanulate-tubular, markedly longer than broad . . . . 33. **C. microphylla** (Pall.) Lam.

+ Leaflets to 23–35 mm long; calyx campanulate broader and as long as broad (Series Arborescentes) . . . . 31.

31. Corolla (23) 25–27 mm long, the limb 2–2.5 times as long as the claw; calyx glabrous or sparsely covered with straight appressed hairs; leaflets (2) 3 or 4 pairs . . . . 32.

+ Corolla 16–20 mm long, the limb 1.5 times as long as the claw; calyx with a soft indument of thin implexed hairs; leaflets 4–8 pairs . . . . 33.

32. Branches brownish yellow; pedicels in groups of 2 or 3 . . . . 31. **C. praini** C. K. Schn.

+ Branches greenish gray; pedicels usually solitary . . . . 30. **C. turkestanica** Kom.

33. Petioles glabrous or the largest initially with few hairs at base; pod 20–45 mm long and 4.5 mm broad; leaflets 4–8 pairs, always cuneate at base . . . . 29. **C. fruticosa** (Pall.) Bess.

+ Calyx rather densely hairy, rarely the hairs finally thinning out; pod 36–65 mm long and 3.5–5 mm broad; leaflets 4–6 pairs, mostly rounded at base . . . . 28. **C. arborescens** Lam.

Series 1. **Chamlagu** Pojark. nov. – Leaves partly pseudo-digitate, partly pinnatifid; calyx broadly tubular, gibbous at base; standard narrow, oboval, gradually narrowing into a claw; wings with limb 1.5 times as long as claw and a small obtuse auricle. Two species: C. chamlagu Lam. in China and C. ussuriensis (Rgl.) Pojark.

1. **C. ussuriensis** (Rgl.) Pojark. in Addenda X, p. 295. – C. frutescens β ussuriensis Rgl. in Mém. Acad. Sc. St.-Pétersb., VII sér., IV, 1 (1862) 44. – C. chinensis Maxim. Prim. fl. amur. (1859) 470 (nomen nud.) non Turcz. – C. chamlagu Kom. Fl. mansh. II (1904) 579, non Lam.; Ej. Monogr. in A. H. P. XXIX, fasc. 2 (1909) 200, ex parte, quoad pl. e.-Mandshur. Kom. and Klob.-Alis., Opred. rast. Dal'nevost. kr. II (1932) 671.

A low shrub; shoots erect, more or less ribbed, the annotinous glabrous, shining, brown, the older grayish brown leaf rachises, stipules narrowly triangular, long-acuminate, spinescent; 2–15 mm long, partly deciduous and partly persistent and pungent; leaves with 2 pairs of leaflets, some (especially those of lower leaves on short shoots) nearly digitate, others (mostly on long sterile shoots and the upper ones on short shoots) pinnatifid; leaflets firm to subcoriaceous, dark green and lustrous above, paler beneath, prominently veined, glabrous, oblongly oval-obcuneate, 2.5–4 (mostly 3) times as long as broad, obtuse to subacute or often apiculate from emarginate apex; petiolules 0.5–1 mm long; pedicels solitary or rarely twin, 1-flowered, ca. 2 cm long, articulate near the middle; calyx broadly tubular, 6–9 mm long and 5 mm broad, gibbous at base, the broadly triangular teeth abruptly short-pointed; corolla 23–25 mm long, bright yellow, finally reddening; standard narrowly oboval, shallowly emarginate at apex; wings narrow, oblong, obtuse, with limb twice as long as claw and a short acutish auricle; keel acutish; ovary glabrous; pod flattened laterally, acuminate, 33–35 mm long. Fl. July; fr. August. (Plate XXIII, Figure 1).

Rocks, forest glades, and roadsides. – Far East: Uss. **Gen. distr.:** Jap.-Ch.: Manchuria. Described from the Ussuri River. Type in Leningrad.

Economic importance. Ornamental, cultivated in Europe since 1773. The roots of C. chamlagu, a species closely related to ours, are used in Chinese medicine as a tonic and restorative.

Note. This species was united in the past with C. chamlagu Lam. The latter is distributed in China, from Chihli [Hopeh] to Yunnan and differs markedly from C. ussuriensis in the following characters. The larger corolla is 28–30 mm long; the very large calyx is 12–14 mm long and 6–9 mm broad; the obovate leaflets are broad at base and have a length to width ratio of 2 : 1.

Series 2. **Frutescentes** Kom. em. Pojark. – Calyx tubular or tubular-campanulate, slightly enlarged at base; wings and keel with claw about the length of blade and a short auricle; leaflets closely approximate at the end of a common petiole (pseudo-digitate); petioles on short shoots deciduous, on long shoots often transformed into spines 4–10 mm long; in addition to our species, this series also includes C. polovrensis Franch. from Kunlun and Chinese Turkestan.

333 2. **C. frutex** (L.) C. Koch, Deutsch. Dendr. I (1869) 48; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 224; Grossg., Fl. Kavk. II (1930) 294; Kryl., Fl. Zap. Sib. VII, 1619. – Robinia frutex L. Sp. pl. (1753) 723. – Robinia frutescens Pall. Fl. Ross. I (1784) 69. – Caragana frutescens DC., Prodr. II (1825) 268; Ldb. Fl. Ross. I, 569; Korsh. Tent. fl. Ross. or. (1898) 106; Kryl., Fl. Alt. 231; Shmal'g., Fl. I, 252. – C. parvifolia Hoffmans. Preiss. verz. Pfl. VIII (1841–1842) 39. – C. digitata Lam., Encycl. méth. I (1783) 616. – Aspalathus frutescens O. Ktze. Rev. gen. (1891) 161. – Ic.: Pall. l. c. tab. XLIII. – Exs.: HFR No. 1161. Vernacular names: dereza, stepnaya chiliga.

A profusely branched shrub, 0.5–1.5 (2) m high, with erect, dark greenish-gray or yellowish-gray shoots and branches; shoots slender, often virgate, at first yellow, finally brown, ranging from almost unarmed to strongly spiny; stipules triangular-subulate, on long shoots partly deciduous and partly transformed into acicular or subulate spines 1.5–5 mm long; leaf-rachises on short shoots 1.5–10 mm long, deciduous, on long shoots to 15 mm long and largely persistent; leaflets varying greatly in size and shape, from firmly membranous to subcoriaceous, light green, glabrous or very rarely pubescent, obovate-cuneate, obtuse to acute and apiculate; pedicels solitary, rarely in groups of 2 or 3, commonly 1-flowered, mostly twice or rarely 3–4 times as long as calyx, articulate above the middle; calyx tubular-campanulate, 6–8 mm long, slightly enlarged at base; calyx-teeth triangular, acute, pungent, tomentose-margined; calyx-tube 4–4.5 times as long as the teeth; corolla bright yellow, 18–25 mm long; limb of standard broadly obovate, abruptly narrowing into and 3.5 times as long as the claw; wings enlarged toward apex, the limb 1.5 times to twice as long as the claw, the spurlike or rarely triangular auricle one quarter to two fifths as long as the claw; keel obtuse, with claw and auricle in similar ratio; pod cylindric, 2.5–4 cm long and 3–4 mm broad. Fl. May–July; fr. from July.

Shrub thickets among feather-grass steppes and steppelike meadows, dry slopes, riverside terraces, shore cliffs, forest margins, and mixed or pine forests. — European part: M. Dnp., Bes., Bl., L. Don, V.-Don, V.-Kama (S. part), Transv., L. V.; Caucasus: Cisc.; W. Siberia: Ob (S.part), Irt., U. Tob. (Mugodzhar Hills), Alt. (only W. part); E. Siberia: Ang.-Say. (SW part); Centr. Asia: Balkh., Dzu.-Tarb. **Gen. distr.**: Mong. Described from Siberia. Type in London.

4 **Economic importance.** A widely cultivated ornamental shrub, suitable for stabilizing slopes. Nectariferous.

Note. A very polymorphic species; in northern regions it is characterized by large-leaved and large-flowered specimens with mostly subcoriaceous, narrowly obovate leaflets 10–25 mm long, terminating in a spinule 0.5–1 mm long; rachis minutely spinous-tipped, deciduous like leaflets; and flowers 22–25 mm long (f. typica C. K. Schn. Ill. Handb. d. Laubh. II (1907) 102; Kom. Monogr. 225. — C. frutescens var. angustifolia DC.), occasional specimens have leaflets to 30 mm long and 17 mm broad, and flowers to 28 mm long (f. latifolia C. K. Schn. l. c., Kom. 226). In the southern periphery of its distribution range, C. frutex often acquires a strongly xeromorphic habit: the shoots are strongly spiny by persistent and lignified leaf rachises and stipules; leaflets are stiff, pungent, and do not exceed 6–15 mm in length; flowers are only 18–20 mm long (var. xerophytica C. K. Schn., l. c.; Kom., l. c. 226), compare note under C. mollis. A form occurring in cultivation, f. grandiflora Koehne, has flowers to 28 mm long, with a short and broad calyx.

3. **C. mollis** (DC.) Bess., Enum. pl. Volhyn. (1822) 29, 74; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 235; Grossg., Fl. Kavk. II, 294. — Robinia tomentosa Fisch. Hort. Gorenk. (1812) 71, nom. nud. — Robinia mollis M. B. Fl. taur.-cauc. III (1819) 478. — Caragana frutescens β mollis DC., Prodr. I (1825) 268; Ldb. Fl. Ross. I, 570; Shmal'g., Fl. I, 252. — C. pontica Turcz. in sched. — C. frutex var. b. mollis C. K. Schn. Laubholzk. I (1907) 102.

A shrub to 1 m high, with gray bark and slender light-colored pubescent shoots; stipules to 7 mm long, membranous or setaceous; leaf rachis pubescent, terminating in a hard spine 2.5 mm long, mostly becoming indurated and persistent; leaflets softly grayish-hairy on both sides, thin at first, becoming firm, prominently veined beneath, 7–18 mm long and 2.5–8 mm broad, cuneate-obovate, with a spinous cusp 1–1.5 mm long from broad obtuse apex; pedicels solitary, articulate near or above the middle, pubescent, 10–21 mm long; calyx 7–8 mm long, broadly tubular, pubescent outside, the lance-triangular spinous-pointed teeth 2–3 mm long; corolla yellow, 22 mm long; standard with a broadly obovate to suborbicular limb twice as long as and abruptly tapering to a narrow claw; wings with limb enlarged toward apex, the claw two thirds to three quarters as long as the limb, the auricle one quarter (one third) the length of the claw; keel broad, obtuse; ovary appressed-hairy; pod linear, 2.5–3.2 cm long and 3 mm broad, slender-pointed, sparsely hairy in maturity. Fl. May.

Dry steppe and stony slopes. – European part: Bes., Bl., U.Dns., L.Don; Caucasus: Cisc. Endemic. Described from Volhynia. Type in Kiev

335 **Economic importance.** Used for ornament; known in cultivation since 1818.

Note. C.mollis, while readily distinguishable from C.frutex C.Koch by the dense soft pubescence of the shoots, leaves, calyx, and ovary, is very closely related to that species. The affinity becomes particularly apparent when C.mollis is compared with extremely xeromorphic forms of C.frutex which often occur in the southern regions and are usually designated as F.xerophytica C.K.Schn. In respect of various characters (small leaves and flowers, somewhat narrower calyx, strong armature) this form comes closer to C.mollis than to typical mesophytic forms of C.frutex. The possibility thus suggests itself that C.mollis and C.frutex f.xerophytica may be two parallel forms (glabrous and pubescent) of a single race confined to the southern extremity of the C.frutex area. On the other hand, such circumstances as imperceptible transitions between f.xerophytica and typical C.frutex, which render separation impossible, its much wider distribution, and the great variability of C.frutex in the southern regions, indicate that the interrelationship between C.mollis and the southern forms of C.frutex cannot be sorted out without detailed field studies of the two species.

4. **C.camilli-schneideri** Kom. Monogr. in A.H.P. XXIX, 2 (1909) 217; B.Fedch., Rast. Turkest. (1915) 514. – C.frutescens B.Fedtsch. in A.H.P. XXXIV (1905) 175, non DC. – C.frutex var. subalata Kom. l.c. 226. – Ic.: Kom. l. c. tab. VI, f. 6.

A low shrub, with yellowish-gray or greenish-gray bark, mostly with narrow whitish corky stripes; young shoots sparsely pubescent, slender, sometimes virgate; annotinous shoots light brown; stipules mostly persistent spinescent, 2.5–7 mm long, rarely deciduous; rachises on long shoots soon hardening into rather thick spines 3–11 mm long; stipules on short shoots to 4 mm long, deciduous; leaflets 5–20 mm long and 2–9 mm broad, green or grayish, paler beneath, glabrous or more or less hairy, cuneate-obovate, mostly elongate, acute, the midrib produced into a spinous point; pedicels solitary or twin 1-flowered, appressed-hairy, 5–9 mm long, articulate above or below the middle; bracts 2, very small; calyx appressed-puberulent, campanulate-tubular, 8–10 mm long and 5–6 mm broad, the triangular acuminate spinous-tipped teeth 2–3 mm long; corolla 22–30 mm long, yellow or golden, at length more or less reddening; standard with a broadly ovate-rhombic limb abruptly narrowing into and twice as long as claw; wings somewhat enlarged at apex, twice as long as claw, the recurved spurlike auricle one third to two fifths the length of claw; keel obtuse, the limb about as long as claw, the auricle short and obtuse; ovary densely hairy; pod 6 linear, obliquely pointed, sparsely puberulent in maturity, 4–5 cm long and 4.5–6 mm broad. Fl. May–June; fr. July.

Taluses, and stony or steppe foothill slopes. — W. Siberia: Alt. (Lake Marka-kul'); Centr. Asia: Dzu.-Tarb. (Saur, foothills of the Dzungarian Ala Tau), T. Sh. (Trans-Ili and Kirghiz ranges). **Gen. distr.**: Dzu.-Kash. (Kuldja). Described from Kuldja. Type in Leningrad.

Economic importance. May be used as an ornamental shrub.

5. **C. laeta** Kom. Monogr. in A. H. P. XXIX, 2 (1909) 215; B. Fedch., Rast. Turkest. (1915) 514. — C. frutescens var. intermedia Rgl. in Bull. Soc. Nat. Mosc. XXXIX (1866) 570. — ? C. gerardiana Koopman in Izv. Obshch. Sadov. (1881) 204. — C. frutescens O. et B. Fedtsch. in A. H. P. XXVIII (1907) 4, non DC.; Ej. Consp. fl. turkest. II, 175, ex parte. — Ic.: Kom., l. c. tab. VI, f. B.

A shrub 1–2 m high, with greenish-gray or brownish-gray bark; shoots long slender, angled, strongly spinose, brownish yellow, with narrow white corky stripes; stipules woody-acicular, to 5 mm long; rachises 7–13 (15) mm long, on long shoots soon becoming thickened and lignified and persistent as spines, on short shoots thin and deciduous; leaflets light green on both sides, glabrous or sparsely appressed-hairy, initially thin, finally subcoriaceous, cuneate-obovate, spinous-tipped from rounded or truncate or emarginate apex, 4–13 (17) mm long and 2.5–7 mm broad; pedicels solitary or in pairs, stout, hairy, articulate near the middle, 5–10 mm long; calyx green, mostly with short appressed hairs, rarely glabrous, campanulate-tubular or tubular, 10–14 mm long; calyx-teeth 1.5–3 mm long, broadly triangular, spinous-pointed; standard 26–35 mm long and 13–20 mm broad, the oboval cuneate-based limb about three times as long as claw; wings sublinear, attenuate at apex, the claw three quarters as long as limb, the spurlike auricle one fifth to one quarter the length of claw; keel obtuse, the limb about as long as claw, obliquely truncate at base or minutely auriculate; ovary commonly glabrous, rarely hairy; pod linear, obliquely acuminate, 3–5 cm long and 3–4.5 mm broad; seeds brown, dark-spotted. Fl. July–August; fr. from August.

Dry slopes of gullies, river and lake terraces, and stony taluses; solitary or in groups. — Centr. Asia: Dzu.-Tarb (Dzungarian Ala Tau), T. Sh. (Centr.), Pam.-Al. (N. slopes of the Alai Range). **Gen. distr.**: Dzu.-Kash. (Kashgaria). 7 Described from central Tien Shan. Type in Leningrad.

Note. The great amplitude of variability in respect of some of the characters points to the need for further study of this species.

6. **C. turfanensis** (Krassn.) Kom. Monogr. in A. H. P. XXIX, 2 (1909) 213. — C. frutescens var. turfanensis Krassn., Opyt razvitie Flory vostochnogo Tyan'-Shanya [Experiment in Development of Flora of Eastern Tien Shan] in Mém. Soc. Russ. d. géogr. XIX, (1888) 336; Ej. Enum. pl. anno 1886 in Tian-schan lect. (1887) 41. — C. turfanensis Krassn. in Mém. Soc. Russ. de géogr. l. c., pp. 189, 256, 267, nomen nudum.

A profusely branched shrub to 1 m high, with shining golden-brown bark; shoots short, strongly spinose, light brown, with white corky stripes at angles; stipules and leaf rachises on long shoots soon hardening into subulate or often acicular spines, 4–7 and 7–13 mm long respectively, the upper part of shoots often leafless and densely beset with spines alone; stipules and rachises on short shoots partly deciduous and partly persistent; leaflets to 6 mm long and 3.5 mm broad, glaucescent-green, glabrous or sparsely appressed-hairy, cuneate-oboval, emarginate or rounded at apex, the midrib produced into a spinous point; pedicels solitary, 1-flowered, 2.5–4 mm long, stout, articulate in upper part; calyx tubular, enlarged at base, 8 mm long, slightly puberulent; calyx-teeth short, triangular, spinous-tipped; corolla yellow; standard oboval, 16–22 mm long and 12–13 mm broad, the limb 2–2.5 times as long as claw; wings sublinear, obliquely truncate at summit, the limb 1.5 times as long as claw, the rather broad triangular auricle one quarter the length of claw; keel obtuse, the claw but slightly shorter than the auricled limb; ovary glabrous; pod 30–45 mm long and 4–6 mm broad. June–July.

Stony slopes and escarpments of river terraces, thickets, wormwood deserts, takyrs, [clay-surfaced desert], and dry riverbeds. — Centr. Asia: T. Sh. (to the south of Lake Issyk-kul'). **Gen. distr.:** Dzu. -Kash. (Kuldja and Kashgaria). Described from the Uch-Turfan region in Kashgaria. Type in Leningrad.

Note. A species closely resembling C. laeta Kom., and not always readily distinguishable from its more extremely xeromorphic forms. The distinguishing characters are smaller flowers with shorter wing-claws, golden-brown bark, abbreviated shoot internodes, and stronger armature throughout.

338 Series 3. **Grandiflorae** Pojark. — Calyx tubular, gibbous at base; standard oboval, gradually narrowing to a claw; wings with claw about as long as limb and short-auricled; all leaves nearly digitate, the minutely petioluled leaflets narrowly lanceolate or narrowly oboval. In addition to our species, the series also includes C. opulens Kom. of N. and central China (Chahar and Kansu provinces) and C. kansuensis Pojark.

7. **C. grandiflora** (M. B.) DC. Prodr. II (1825) 268; Ldb. Fl. Ross. I, 570; Shmal'g., Fl. I, 252, ex parte; Medv., Der. i kust. Kavk. (1919) 80. — C. grandiflora var. bibersteini et var. steveni C. K. Schn. Laubholzk. I (1907) 101; Grossg., Fl. Kavk. II, 293. — Robinia grandiflora M. B. Fl. taur. -cauc. II (1808) 168. — C. grandiflora var. biebersteinii (ex parte), var. steveni (ex parte) et var. pedunculosa Kom. Monogr. in A. H. P. XXIX, 2 (1909) 220.

A shrub ca. 1 m high; young shoots glabrous or pubescent, to 30–40 cm long; annotinous shoots whitish or brownish gray, angled, mostly with prominent white corky stripes at angles; bark of branches brownish gray; stipules 2–3 mm long, hardening into spines; leaf rachises pubescent, on long shoots 5–11 mm long, terminating in a spine to 4 mm long, markedly thickening and becoming indurated, persistent (shoots and branches strongly spinose), on short shoots shorter, deciduous; leaflets oblanceolate or

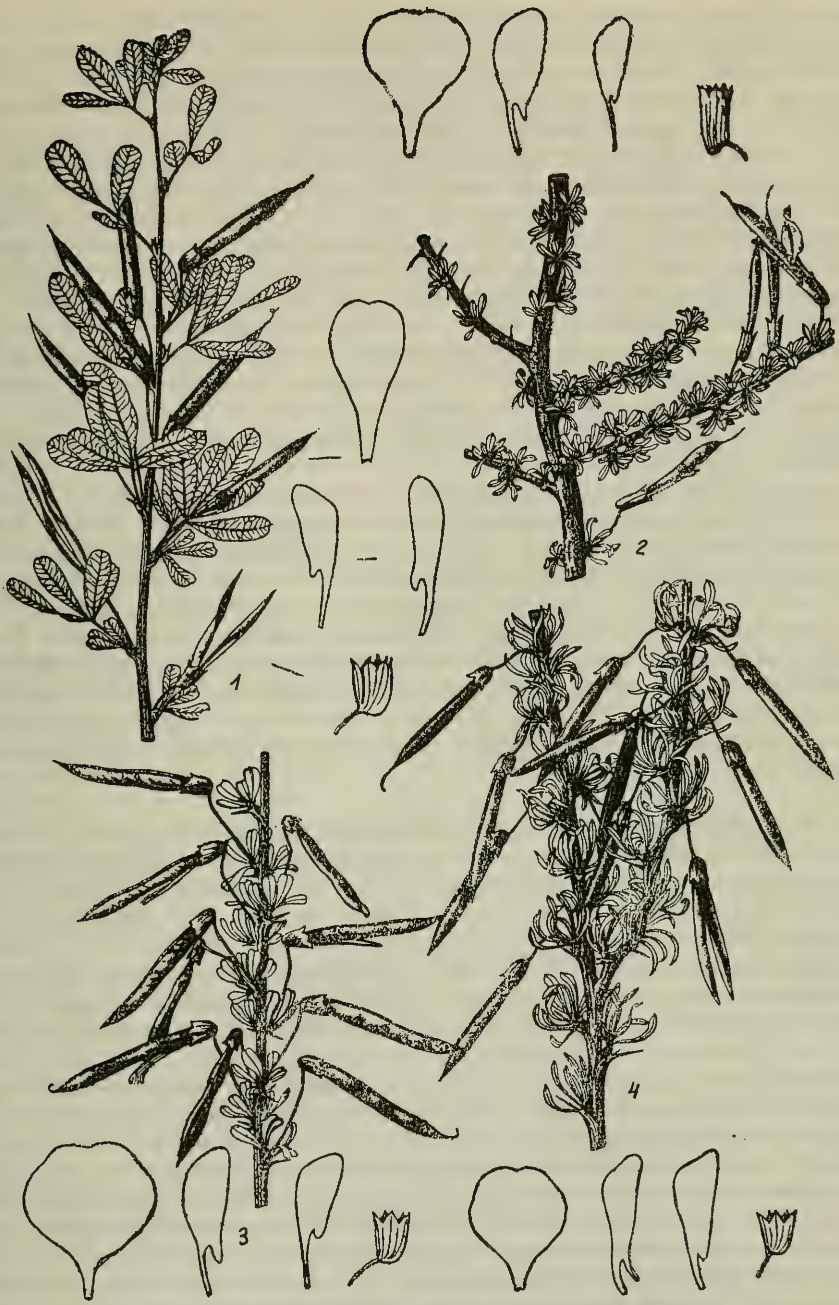

PLATE XXIII. 1 — *Caragana ussuriensis* (Rgl.) Pojark., branchlet and flower parts; 2 — *C. balchaschensis* Krassn., branchlet and flower parts; 3 — *C. alaica* Pojark., branchlet and flower parts; 4 — *C. aurantiaca* Koehne, branchlet and flower parts.

narrowly oboval, cuneate at base,obtuse to acute at apex, with a cusp 1 mm long, glabrous or appressed-hairy to almost tomentose, 4–12 mm long and 1–3 mm broad; pedicels solitary, glabrous or pubescent, articulate mostly below the middle, 5–15 mm long; calyx green variously suffused with purplish brown, tubular, strongly gibbous at base, glabrous or rarely pubescent, (11) 12–16 mm long; calyx-teeth 2.5–4 (5) mm long, narrowly triangular, long-acuminate with setaceous apex; corolla 26–31 mm long; standard yellow, at length partly reddening, the oboval to almost broad-elliptic limb gradually narrowing into and 2–3 times as long as claw; wings with claw two thirds as long as limb and auricle 1.5 mm long; keel obtuse; ovary glabrous or appressed-hairy; pod linear, pointed, 27–40 mm long and 2.5–4 mm broad, glabrous or hairy. Fl. May; fr. July.

Dry, mostly stony, calcareous and chalky mountain slopes, hills, gullies, 341 and sandy mounds. — Caucasus: Cisc. (Kuban and Terek rivers), E. and S. Transc.; Centr. Asia: Ar.-Casp. (Mangyshlak, Ust-Urt), Mtn. Turkm. (Balkhan Mountains). **Gen. distr.**: Arm.-Kurd. Described from the vicinity of Tbilisi. Type in Leningrad.

Economic importance. Cultivated for ornament since 1823.

Note. A polymorphic species, in need of further study. Besides the occurrence throughout its distribution area of parallel forms with glabrous and densely pubescent leaves and ovary (var. steveni C. K. Schn. and var. biebersteini C. K. Schn., respectively), one should also note variability of apparently geographical nature, since the few available specimens from Ciscaucasia differ from the Transcaucasian in having slende shoots and, on the average, narrower leaves; again, certain specimens from Turkenia are characterized by calyx-teeth up to 5 mm long as well as longer pedicels (var. pedunculosa Kom.), features that have not been encountered elsewhere.

8. **C. scythica** (Kom.) Pojark. in Addenda X, p. 296. — C. grandiflora Schmalh., Fl. I (1895) 252 (ex parte) et auct. fl. Ross eur. — C. pygmaea Fiek in Oesterr. bot. Zeitschr. (1885) 165, non DC.; Fedch. and Fler., Fl. Sr. Ross. (1910) 564. — C. grandiflora var. scythica Kom. Monogr. in A. H. P. 2 (1909) 220.

A shrub 12–35 cm high, densely leafy; shoots short, very slender 0.4–1 mm in diameter, brown, pubescent; branches similar, 1–2 mm thick, angled, brownish gray, the corky stripes poorly developed or none; stipules 0.5–1.2 mm long, on long shoots often persistent as very slender spines; leaf rachises on long shoots 2–7 mm long, very thin with short spinous tip, not always hardening and persistent, on short shoots 0.3–0.75 mm long, deciduous; leaflets cuneate, oboval or oblanceolate, shortly cuspidate from subacuminate or obtuse apex, pubescent on both sides or merely above, 2–9 mm long and 0.3–1.8 mm broad; pedicels solitary, mostly articulate in lower part, rarely near the middle; calyx tubular, distinctly auricled at base, glabrous, 8.5–11.5 mm long; calyx-teeth ca. 3 mm long, one quarter to one third as long as tube, triangular, acute or acuminate, tomentose on the margin; corolla 17–24 mm long; standard with oboval limb 2–2.5 times as long as claw; wings with limb about as long as claw, the narrow auricle one fifth to one quarter the length of claw; keel obtuse; ovary glabrous; pod linear, 17–23 mm long and 2–2.5 mm broad. June.

Dry steppe and stony slopes. — European part: Bes., Bl. (S. part), L. Don (westernmost part). Endemic. Described from southern regions of the USSR. Type in Leningrad.

2 9. **C. balchaschensis** (Kom.) Pojark. comb. nov. — C. grandiflora γ balchaschensis Kom., Monogr. in A. H. P. XXIX, 2 (1909) 220. — C. balchaschensis Krassn., Opyt razvitie flory vostochnogo Tyan'-Shanya (1888) 255, 337, nomen nud. — C. pygmaea var. parvifolia Krassn. l. c. p. 336, cfr. p. 377. — C. microphylla Krassn. l. c. p. 189, 255, non Lam. — C. parvifolia Krassn., l. c. p. p. 267, 268, non Hoffmans. — C. grandiflora α biebersteinii Kom. l. c. ex parte. — C. grandiflora ε songorica Kom. l. c.

A low shrub; young shoots pubescent to tomentose, rather slender; annotinous and older shoots light-colored, brownish or whitish, the white corky stripes strongly developed; bark of old branches grayish brown; stipules spinescent, 2—2.5 mm long; rachises pubescent, on short shoots to 1.5 mm long, deciduous, on long shoots 3—7.5 mm long, persistent, woody, slender, distinctly spinous-tipped; leaflets densely pubescent on both sides or rarely only above, cuneately oblanceolate or oboval, spinous-tipped from obtuse or rarely acute apex, 2—11 mm long and 0.75—3 mm broad; pedicels solitary, 4—10 mm long, pubescent or glabrous, articulate above the middle; calyx tubular, less gibbous than in other species of this series, glabrous, 9—11 mm long, the broadly triangular teeth 1.5—2 (2.5) mm long; corolla 18—23 mm long, bright yellow, finally reddening; standard with oboval limb gradually narrowing into 2—2.5 times as long as claw; wings enlarged toward apex, with limb about as long as claw, the auricle one fifth to one quarter the length of claw; keel obtuse, long-clawed; ovary glabrous or sparsely hairy in upper part; pod 27—37 mm long and 4—4.5 mm broad, glabrous, obliquely acuminate. Fl. April—May; fr. June. (Plate XXIII, Figure 2).

Dry steppe, stony, gravelly, chalky, and sandy slopes of gullies, hills, and low mountains, and borders of wormwood and saltwort-and-wormwood deserts. — Centr. Asia: Ar.-Casp. (as far west as the Emba River and the city of Orsk), Balkh., T. Sh. (only W. part: Karatau, Chimkent and Dzhambul areas). Endemic. Described from Andrakai. Type in Leningrad.

Note. C. balchaschensis differs markedly from C. grandiflora DC. and C. kirghisorum Pojark. in having much smaller flowers, short calyx-teeth, and very spiny branches and shoots, the spinelike petioles often leafless from the beginning. This is a very pronounced xerophyte associated with dry slopes of low mountains in W. and S. Kazakhstan and occasionally penetrating into the outskirts of adjoining deserts.

10. **C. kirghisorum** Pojark. in Addenda X, p. 296. — C. grandiflora β steveni Kom. Monogr. in A. H. P. XXIX, 2 (1909) 220, ex parte.

3 A much branched shrub, 0.3—1 m high; young shoots glabrous; annotinous light brownish gray to whitish, angled, like older shoots with more or less developed white corky stripes; bark of old branches brownish gray; stipules on long shoots indurated, subulate, to 3 mm long; leaf rachises on long shoots 3—13 mm long, distinctly subulate-tipped, becoming woody and thickened, mostly arched, on short shoots shorter and deciduous; leaflets cuneate-oblanceolate, mostly acute, spinous-tipped; pedicels 1-flowered, 6—8 mm long, glabrous; calyx glabrous, more or less purple-tinged, 12—15 mm long, prominently gibbous at base, the triangular teeth 2.5 mm long and 2.5—3.5 mm broad; corolla 27—32 mm long, yellow; standard turning pinkish, 13—17 mm long, oboval, gradually narrowing toward base, rounded

at apex or emarginate; wings slightly enlarged toward apex, with limb as long as or slightly longer than claw, the auricle one-seventh to one-sixth the length of claw; keel obtuse; pod 2.5 cm long and 2.5 mm broad, linear, acuminate. Fl. end of May—June; fr. July—August.

Stony and melkozem [fine-earth] mountain slopes and shores of rivers and lakes. — Centr. Asia: Dzu.-Tarb. (S. foothills of the Dzungarian Ala Tau), T. Sh. (E.-Ketmen Range; Centr.-N. shore of Lake Issyk-kul'; mountains along Chilik River). **Gen. distr.**: probably Dzu.-Kash. (Kuldja) Described from Lake Issyk-kul'. Type in Leningrad.

Note. Closely related to C. grandiflora DC., from which it differs in the short and broad calyx-teeth.

Series 5. **Pygmaeae** Kom. Monogr. in A. H. P. XXIX, 2 (1909) 240. — Calyx rather small, tubular or tubular-campanulate, mostly not enlarged toward base or very slightly so; standard broad, abruptly narrowing to a claw; pod 8—10 times as long as broad; petioles on axillary shoots very short, thus leaflets apparently arising in a cluster from the axillary bud; petioles of long shoots 3—10 mm long, spinescent. In addition to our species, this series also includes C. versicolor Benth. (N. Himalayas and Tibet) and C. densa Kom. (in central China).

11. **C. pygmaea** (L.) DC. Prodr. II (1825) 268; Ldb. Fl. Ross. I, 570, ex parte; Turcz. Fl. baic.-dah. I, 287. — Robinia pygmaea L. Sp. pl. (1753) 723; Pall. Fl. Ross. I (1784) 71. — C. pygmaea β arenaria Ldb. Fl. Ross. I (1842) 571, non Fisch. — C. incana Bge. in sched. — C. arenaria Bge. in sched. — C. nitida Fisch. in sched. — Aspalathus pygmaeus O. Ktze. Rev. gen. (1891) 161. — C. pygmaea var. typica (ex parte) et var. angustissima C. K. Schn. Laubholzk. II (1907) 102; Kryl., Fl. Zap. Sib. VII, 1621. — C. pygmaea α pallasiana Kom. Monogr. in A. H. P. XXIX, 2 (1909) 241, ex parte. — C. pygmaea β angustissima a
344 longifolia et b brevifolia Kom. l. c. 242; Kryl., l. c. 1621. — C. komarovii Schischk. in Mitt. d. Tomsk. Abt. Russ. Bot. Gesellsch. III (1931) 118 nom. nud., non Lév. — C. pygmaea var. komarovii Schischk. in Kryl., Fl. Zap. Sib. VII (1933) 1621. — C. splendens Schischk. in sched. — Ic.: Pall. l. c. tab. 45.

Shrub to 100 cm high, rarely higher, with smooth shining golden bark; shoots slender, virgate, straight, suberect, pubescent when young, rarely glabrous; stipules on long shoots spinescent, 1.5—4 mm long, persistent; rachis hardening into a very slender acicular spine 2.5—4 mm long persistent for 2—3 years; leaflets light glaucescent-green on both sides, mostly glabrous, rarely subappressed-hairy, oblanceolate (var. pallasiana Kom. ex parte) or linear-oblanceolate (var. angustissima C. K. Schn.), often conduplicate, acute or acuminate, spinous-tipped, very gradually attenuate toward base, (4) 8—22 mm long and 1—2.5 mm broad; pedicels solitary, 1-flowered, articulate near the middle, 6—18 mm long; calyx tubular (not enlarged toward summit), 7.5—9.5 mm long, about twice as long as broad, mostly grayish-pubescent outside, rarely glabrous; calyx-teeth narrowly triangular, acuminate, spinous-pointed, one-third as long as tube; corolla 17.5—22 mm long, yellow; standard with obovate obtuse limb abruptly narrowing into and 2.5—3 times as long as claw; wings with subparallel margins or slightly dilated toward apex; both wings and keel with limb

1.5 times as long as claw and with auricle one fifth to one quarter the length of claw; ovary densely covered with appressed gray hairs; pod 23–30 mm long and 3–3.5 mm broad, pointed at both ends, initially hairy, glabrous in maturity. Fl. mid-May to end of July; fr. from July.

Steppes, dry hills, stony slopes, taluses, steppe valleys of mountain streams, barchan and dune sands (with barchan sand-hillocks piling up around them); sometimes occurring in meadows, even peaty meadows; associated with the steppe belt between the southern forest limit and the desert, avoiding the latter. – W. Siberia: Alt. (SE part), Ang.-Say. (S. part), Dau. (W. part – Selenga area of Dauria). **Gen. distr.:** Mong. (Kentei, Urga [Ulan Bator] area, Khangai). Described from Transbaikalia. Type in London.

Economic importance. The plant covers enormous stretches in the steppes of Transbaikalia and Mongolia, sometimes forming thickets, and in some places constituting the only feed for livestock. Ornamental.

12. **C. stenophylla** Pojark. in Addenda X, p. 297. – C. pygmaea Kom. Fl. mandsh. II (1904) 583, non DC. – C. pygmaea α pallasiana Kom. Monogr. in A. H. P. XXIX, 2 (1909) 241, ex parte.

A spiny shrub 15–70 cm high, with greenish-gray to golden-brown bark; shoots rather short, very thin, angled, pubescent when young; stipules and leaf rachises on long shoots hardening and persistent for several years, the stipules to 3 mm long, slender, acicular, the rachis to 7 mm long, stouter, straight or recurved; leaflets glaucescent-green, hairy or subglabrous, narrowly linear-lanceolate, tapering to a spinous point, rather closely conduplicate and hence apparently acicular, 4–11 mm long and 0.75–1.5 mm broad; pedicels solitary 5–10 mm long, overtopped by leaves, articulate below the middle; calyx glabrous, rarely sparsely hairy; campanulate-tubular, 5–6.5 mm long; calyx-teeth triangular, acute, spinescent, one-quarter as long as tube; corolla yellow, 14–17 (20) mm long; standard with orbicular or broadly oboval limb, abruptly contracted into and 5 times as long as the claw; wings mostly markedly dilated and obliquely truncate at apex, the limb 2–2.5 times as long as claw, the spurlike auricle two-fifths half the length of claw; keel with limb mostly 1.5 times as long as, rarely twice as long as or sometimes equaling claw, the auricle short and obtuse; ovary always glabrous; pod 2–2.5 cm long and 2.5–3 mm broad. Fl. end of April–September.

Sandy and clayey steppes, dry riverbeds, stony and clayey slopes of mountains and gullies. – E. Siberia: Dau. (SE part – basin of the upper Argun River). **Gen. distr.:** Mong. (E. part), Jap.-Ch. (N. China, provinces of Hopeh, Shansi, Kansu, and Tibet). Described from the Kulun-Buin-Nor Plain in W. Manchuria. Type in Leningrad.

Note. This most easterly race of the series Pygmaeae differs from C. pygmaea (which it resembles most closely in habit), in the smaller flowers with relatively short and broad calyx, and also in bark color.

13. **C. altaica** (Kom.) Pojark. in Addenda X, p. 297. – C. pygmaea var. altaica Kom. Monogr. in A. H. P. XXIX, 2 (1909) 242; Kryl., Fl. Zap. Sib. VII, 1621. – Exs.: HFR No. 508.

A much branched shrub; shoots virgate, angled, reddish brown, appressed-pubescent when young; bark of branches dark brownish; stipules and rachises on long shoots hardening into straight subulate spines, 6 and 10 mm long, respectively; leaflets dark green, almost concolorous, glabrous, flat, narrowly oboval, rounded at apex or rarely short-acuminate, apiculate, 6–19 mm long and 1.5–2.25 mm broad, sometimes (lusus a. latifolia Kom.) to 23 mm long and 3 mm broad; pedicels shorter than leaves, glabrous, articulate at or somewhat below the middle; calyx glabrous, campanulate-tubular, markedly enlarged toward summit, 6–7 mm long and 4.5–6 mm broad; 346 calyx-teeth ovate-triangular, acute, 1.5–2 mm long, often more or less curved and asymmetric; corolla yellow, finally reddening, 18–20 mm long; standard with oboval limb ranging from relatively narrow (1.5 : 1) to almost orbicular-rhombic (1 : 1) and 3–3.5 times as long as claw; wings mostly narrow (4 : 1), with parallel margins, rarely broader (2.5 : 1) and somewhat dilated toward apex, the limb 1.5–2 times as long as the claw, the auricle one-fifth to one-quarter the length of claw; keel with limb 1.5–2 times as long as claw, the auricle obsolescent; ovary glabrous; pod 2.5–4 cm long and 2.5–3.5 (4) mm broad. Fl. June; fr. July.

Rocks and stony slopes. — W. Siberia: Alt. (E. part); E. Siberia: Ang.-Say. (W. Sayans). **Gen. distr.:** Mong. (only in adjoining districts of the Tuva People's Republic*). Described from the village of Shebalina in Altai. Type in Leningrad.

Economic importance. Deserving attention as an ornamental plant.

Note. Hybrids C. altaica (Kom.) Pojark. X C. pygmaea (L.) DC. apparently occur fairly frequently where the two species grow together (Altai, W. Sayans, Tannu-Tuva*). The features characteristic for them are mostly dark bark, dark green lustrous glabrous leaves, either linear-lanceolate or narrowly oboval, always shorter than in C. altaica; also the tubular calyx, markedly enlarged toward summit, glabrous or sparsely pubescent. Such specimens are described as C. pygmaea δ viridissima Kom., Monogr., 242. Occasional hybrids have lighter golden bark and glaucescent leaves, approaching in habit C. pygmaea (L.) DC.

14. **C. pumila** Pojark. in Addenda X, p. 298. — C. aurantiaca var. deserticola Kom. Monogr. in A. H. P. XXIX, 2 (1909) 251, ex parte; Kryl., Fl. Zap. Sib. VII, 1622 (pl. ex Baraba et reg. Semipalatinsk). — C. pygmaea auct. fl. As. Mediae ex parte, non DC.

Shrub 20–40 (60) cm high, much branched, spiny; bark of old branches rather dark grayish green or brownish green; shoots reddish brown, slender, short, erect, densely leafy, angled, puberulent when young; stipules and rachises on long shoots soon hardening into aciculate, mostly straight spines 3–5 mm and up to 9 mm long, respectively; leaflets narrowly oblanceolate to linear-oblanceolate, spinous-tipped from acuminate or rarely obtusish apex, more or less reddish-tinged beneath, appressed-hairy on both sides, 3–12 mm long and 0.75–1.5 (2) mm broad; pedicels 2.5–12 mm long, pubescent, articulate at or below the middle; calyx tubular-campanulate, markedly enlarged toward summit, glabrous, 5.5–6.5 mm long and 3.5–4.5 mm broad; teeth triangular, gradually acuminate, separated by narrow sinuses; corolla 13–20 mm long, egg-yellow, finally more or less reddening; standard 347 broadly oboval, abruptly contracted into and 3.5–5 times as long as the claw; wings with limb 2.5–3 times as long as claw, narrow (3–3.5 : 1), slightly enlarged upward, the linear auricle half to two thirds as long as and sometimes broader than claw; keel with limb twice as long as claw; ovary glabrous; pod ca. 2.5 cm long and 2.5 mm broad. Fl. June—July; fr. August.

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* [Since 1961 the Tuva ASSR.]

Steppe, meadow, and stony slopes of low mountains. — W. Siberia: Irt. (S. and SE part); Centr. Asia: Balkh. (SE part), Dzu.-Tarb. (Tarbagatai, N. foothills of Dzungarian Ala Tau). Endemic. Described from N. part of Kazakhstan, from mountains of Chelak-kuyanda. Type in Leningrad.

Note. A species characteristic for the mountain areas of N. and E. Kazakhstan, reaching its W. limit at Mt. Ulutau and spreading eastward to the N. foothills of Altai and southward to Turbagatai and N. foothills of Dzungarian Ala Tau. It differs from the closely related species C. leucophloea Pojark. (with which it was combined under the name C. aurantiaca var. deserticola Kom.) in its dwarfness, dark bark, very slender spines, narrower acute leaflets, narrower calyx, and shorter wing auricles. Usually identified in herbaria and reported in the literature under the name C. pygmaea. This species, while closely resembling C. pumila in habit, is readily distinguishable by the bright golden bark, long shoots, the larger, tubular calyx, hairy ovary, and relatively long-clawed and short-auricled wings.

15. **C. leucophloea** Pojark. in Addenda X, p. 299. — C. pygmaea var. arenaria Fisch. in sched. — C. aurantiaca var. deserticola Kom. Monogr. in A. H. P. XXIX, 2 (1909) 251, ex parte. — C. aurantiaca auct. fl. Asiae Mediae, ex parte, non Koehne.

Shrub in 1 m high; branches divaricate, often angled, rather sparsely leafy, with very light whitish-yellow bark and grayish corky stripes; shoots rather short, angled, appressed-hairy when young; stipules and leaf rachises on long shoots soon hardening into spines, these firm, mostly curved, distinctly thickened toward base, the stipular 4—5 mm, the petiolar 1.5 mm long; leaflets light glaucous, sometimes more or less reddening, lustrous, glabrous or sparsely covered with short appressed hairs, flat, narrowly oboval, obtuse or subacute, apiculate, 4—12 mm long and 1—2 (2.5) mm broad; pedicels 3—8 (10) mm long, articulate mostly below the middle; calyx tubular-campanulate, 5—6 mm long and 3.5—4 (4.5) mm broad, the triangular teeth acute or acuminate; corolla (light?) yellow, 13—18 mm long; standard oboval, the limb 4—5 (6) times as long as claw; wings narrow (4 : 1), with parallel margins, rarely broader (2.5—3 : 1) and dilated toward apex, the limb 3—3.5 times as long as the claw, the auricle 2.5—3.5 mm long, mostly half to two thirds as long as or rarely equaling claw; keel broader than wings, the limb 3—3.5 times as long as claw; ovary glabrous; pod 3—3.5 mm long and 2—3.5 (4) mm broad. Fl. June to mid-August; fr. from August. (Plate XXIV, Figure 1).

Stony and rocky slopes, gravelly and stony deserts, pebbles, and dry riverbeds. — Centr. Asia: Dzu.-Tarb. (Saur, Tarbagatai, and Dzungarian Ala Tau), T. Sh. (E. and Centr. — Kungei and Trans-Ili Ala Tau ranges, Naryn village area). **Gen. distr.**: Dzu.-Kash. (Kuldja area and Chinese Tien Shan), Mong. (W. and Centr. Mongolia). Described from the Syugaty Mountains in the Trans-Ili Ala Tau. Type in Leningrad.

Economic importance. Of value for forage. Ornamental.

Note. A species widely distributed in the steppes of Centr. and W. Mongolia, from the southernmost foothills of the Gobi Altai to the Ubsa

Depression and in northern foothills of Chinese Tien Shan, whence it penetrated into the border regions of Central Asia, especially distributed in the foothills of E. and outer Tien Shan. V. L. Komarov referred this Caranga reservedly to C. aurantiaca, under the name C. aurantiaca var. deserticola Kom., as opposed to the typical form which he named C. aurantiaca var. conferta Kom.; he did not, however, distinguish it from the North Kazakhstan race which we separate here as C. pumila Pojark. From C. aurantiaca Koehne, C. leucophloea Pojark. differs in whitish bark, short flat leaves, shape of calyx, and shorter wing auricles.

16. **C. aurantiaca** Koehne Deutsch. Dendr. (1893) 340; C. K. Schneid. Laubholzk. II (1907) 102. — C. aurantiaca var. conferta seu typica Kom. Monogr. in A. H. P. XXIX, 2 (1909) 250, 254. — C. riparia Schischk. in sched. — Ic.: C. K. Schn. l. c. fig. 64 p—s.

Shrub ca. 1 m high, with dark greenish-gray or brownish-gray bark; shoots ribbed-sulcate, glabrous or rarely somewhat hairy at first, densely leafy; stipules and leaf rachises very soon becoming indurated and transformed into slender straight spines persistent for 2—3 years, the stipular 2—6 mm, the petiolar 5—10 mm long; leaflets glabrous, bright green, concolorous, subfalcate and often twisted, narrowly oblanceolate to linear-oblanceolate, acute or acuminate (some occasionally obtuse), apiculate, very gradually tapering toward base, 8—17 mm long and 1.5—2.5 mm broad (on sterile shoots to 23 mm long and 4 mm broad); pedicels 7—16 mm long, mostly articulate below the middle, glabrous; calyx campanulate, strongly enlarged toward summit, glabrous, 6—8 mm long and 5—6.5 mm broad; teeth broadly triangular, 1.5 mm long, separated by broad sinuses; corolla orange-yellow; standard somewhat shorter than other petals, 17—18 mm long, the suborbicular limb abruptly contracted into and 3—4 times as long as claw; 349 wings and keel 19—20 mm long, with limb 2—2.5 times the length of claw, wings narrow, with subparallel margins and with auricle as long as or at least three-quarters as long as claw; keel with limb half as broad again as that of wings and with auricle one-quarter the length of claw; ovary glabrous; pod 3—4 cm long and 3—4.5 mm broad; seeds ovaloid, brown with black stripes and dots. Fl. June—July; fr. August. (Plate XXIII, Figure 4).

Shores and pebbles of mountain streams, scrub, meadows, and forest margins. — Centr. Asia: T. Sh. (upper course of the Tekes River, Kegen River, the Trans-Ili, Kungei, Kirghiz, and Talass Ala Tau ranges, foothills in region of Andizhan and Namangan). **Gen. distr.:** Dzu.-Kash. (Kuldja, Kucha, Uch-Turfan). Described from a cultivated specimen. Type in Berlin.

Economic importance. Grown for ornament.

Note. A species with a very characteristic habit due to the curved elongate leaflets. Other diagnostic features are the dark bark, the broad campanulate calyx, the very large wing auricles that almost equal the claws in length and mostly also in width. These characters as well as ecological attribues set it clearly apart from C. leucophloea.

17. **C. alaica** Pojark. in Addenda X, p. 299. — C. grandiflora var. steveni Kom. in sched., p. p., non Schn.; A. Borissova in Fl. Tadzhikist. V. (1937) 157. — C. laeta Kom. in sched., p. p.

Shrub; bark brownish gray or greenish gray; shoots glabrous from the beginning; shoots and branches strongly spinose, angled, sometimes with whitish corky stripes at the angles; stipules and leaf rachises on long shoots soon becoming indurated and thickened, transformed into prickly spines persistent for several years, the stipular 2–4.5 mm, the petiolar 4–8 mm long; rachises on short shoots usually obsolescent, deciduous, occasionally 2–3 mm long; leaflets 5–15 mm long and 1.5–4.5 mm broad, glabrous, glaucescent-green, cuneate-oboval (3.5 : 1 to 2.5 : 1), minutely apiculate from rounded emarginate apex, gradually tapering to a narrow cuneate base; pedicels slender, glabrous, exceeding leaves, 1–1.5 (2) cm long, articulate in upper part; calyx glabrous, tubular-campanulate, enlarged at summit, gibbous at base, 5–6 (8) mm long and 4–5 (6) mm broad; teeth triangular, terminating in a cusp, this mostly short, rarely up to 2.5 mm long; corolla bright yellow; standard slightly shorter than other petals, 14–20 (22) mm long, rounded-oboval, abruptly contracted into and 4–5 times as long as claw; wings and keel 17–19 (22) mm long, with limb twice as long as claw and with auricle $(^1/_5)\ ^1/_4 - ^1/_3$ the length of claw; wings enlarged above the middle, obliquely truncate; ovary glabrous; pod 25–37 mm long and 3.5–4 mm broad. Fl. end of May–June; fr. from mid-June. (Plate XXIII, Figure 3).

Stony slopes of mountains, of gullies, and of riverbanks and terraces. – Centr. Asia: Pam.-Al. (N. slopes of the Alai, Turkestan, and Mal'guzar ranges). Endemic. Described from the Lyalyak River gorge on the N. slope of the Alai Range. Type in Leningrad.

Economic importance. May be grown for ornament.

Note. This plant differs markedly from other species of the series in the broad leaves and the calyx enlarged at base; the short wing auricles distinguish it from the Central Asian species.

Series 5. **Dasyphyllae** Pojark. – Calyx tubular-campanulate, 6–7 mm long, with short teeth; standard with broad limb abruptly contracted into a short claw; wings with limb 3 times the length of claw and a long linear auricle; leaves on long shoots distinctly pinnate, the rachis persistent as a stout spine, on short shoots deciduous; leaflets 2 pairs, closely approximate at base (pseudo-digitate).

18. **C. dasyphylla** Pojark. in Addenda X, p. 300. – C. pruinosa Kom. in sched., pro parte.

A strongly spiny branched shrub with light brown bark; annotinous shoots firm, rather stout, usually distinctly thickened below the nodes; stipules persistent, spinescent, 2.5–4 mm long; leaflets 2 pairs, on long shoots rather closely approximate, the rachis 1–2.5 cm long, becoming lignified and persistent as a firm stout spine; rachis on short shoots 2–3 mm long, bearing 4 fascicled leaflets, slender, terminating in a very short hard spine, pubescent, deciduous; leaflets appressed-hairy on both sides, more densely so beneath, grayish, oboval, mostly obtuse, 2.5–12 mm long and 2–3.5 mm broad; pedicels 2–4 mm long, articulate near base, densely hairy; calyx tubular-campanulate, 6–7 mm long, puberulent, densely so only on the teeth, these triangular, acute, one-quarter as long as tube; corolla pale to bright yellow, 16–18 mm long; standard with suborbicular to broadly oboval limb abruptly contracted into claw ca. 3 mm long; limb of wings obtuse, dilated toward apex and (2.5) 3 times as long as claw, the auricle nearly equaling the claw; keel terminating in a short recurved beak, the limb 2.5 times as long as claw, the inconspicuous auricle obtuse; ovary glabrous; pod linear-cylindric, 22–26 mm long and 2.5–2.8 mm broad; seeds narrowly elliptic, obtusish at both ends, greenish with dark spots. Fl. May; fr. July. (Plate XXIV, Figure 2).

351 Dry slopes. Likely to be found in T. Sh. and Pam.-Al. **Gen. distr.:** Dzu.-Kash. (Chinese Tien Shan, S. slopes in region of Pai mountains; Kashgaria, in foothills of Sarikol Range). Described from Bostan-Terek in the Sarikol Range. Type in Leningrad.

Note. The species occupies a somewhat isolated position. In respect of flower structure it approaches species of C. auriantiaca Koehne affiliation, but it differs from them strikingly in its vegetative parts; in habit it greatly resembles C. pruinosa Kom. It differs from this species and its nearest relatives in the distinctive structure of calyx and corolla. As regards the shape of calyx and, to some extent, that of corolla, C. dasyphylla is rather closer to C. maximoviczziana Kom. (Kansu, Tibet), which it resembles in vegetative parts; however, the long claws of wings and keel as well as the partly lignified leaf rachises on short shoots clearly distinguish this species and its Szechwan vicariant, C. erinacea Kom., from C. dasyphylla.

Series 6. **Spinosae** Kom. Monogr. in A.H.P. XXIX, 2 (1909) 60. — Calyx tubular; standard oboval, gradually tapering to claw; claw of wings and of keel as long as or slightly longer than limb, the short auricles obtuse; keel with a short upcurved acutish beak; leaves on long shoots paripinnate, with 2—4 leaflet pairs, the leaf rachises becoming lignified and persistent as stout spines; rachises on short shoots deciduous; leaflets 2 pairs, close to together at the end of petiole (pseudo-digitate). In addition to our species, this series contains C. spinifera Kom. of Tibet.

19. **C. spinosa** (L.) DC. Prodr. II (1825) 269; Ldb. Fl. Ross. I, 571; Turcz. Fl. baic.-dah, I, 288; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 260; Kryl., Fl. Zap. Sib. VII, 1623. — Robinia spinosa L. Mantissa (1771) 269. — Robinia spinosissima Laxm. in Nov. Com. Ac. Petrop. XV (1771) 558. — Caragana ferox Lam. Encycl. méth. I (1783) 615. — Robinia ferox Pall. Fl. Ross. I, 1 (1784) 70. — Caragana spinosissima C. Koch, Dendr. I (1869) 52. — Aspalathus spinosus O. Kuntze, Revis. gen. I (1891) 161. — Ic.: Laxm. l. c. tab. 30, fig. 4; Pall. l. c. tab. XLIV.

A spiny, much branched, erect or more or less prostrate shrub, 25—50 cm high, sometimes up to 1 (2) m; bark greenish yellow, with gray stripes; branches straight or curved, prostrate; young shoots hairy; stipules triangular, membranous, with a stiff midrib, partly persistent, becoming indurated, 2.5—6 mm long; leaf rachises appressed-hairy, on short shoots commonly deciduous, on long shoots persistent, lignified and transformed into spines 1.5—6 cm long; leaves on long shoots paripinnate, with 2—4 leaflet pairs, on short shoots pseudo-digitate with 2 leaflet pairs or very rarely some paripinnate; leaflets narrowly oboval or linear-oblanceolate, narrowly cuneate at base, epiculate from rounded or briefly acuminate 352 apex, sparsely appressed-hairy to glabrate, 7—23 mm long and 1.5—4 mm broad; petiolules very short, hairy; pedicels 2—4 mm long, articulate below the middle, hairy; calyx 7—10 mm long and 3.5—4 mm broad, glabrous; teeth triangular, acute, one-fifth to one-quarter the length of tube, ciliate-margined;

corolla yellow, 20–25 mm long; standard oboval, rather gradually narrowing into claw 3–4 mm long; wings with claw about as long as limb, the auricle 1–2 mm long; keel gibbous, with a short upcurved beak, the claw somewhat longer than limb; ovary glabrous; pod 2–2.5 cm long and 4 mm broad, merely 2–2.5 times as long as calyx; seeds oval, greenish brown. Fl. July–August; fr. September.

Gravelly and stony slopes, steppe solonchaks, riverbanks, forming thickets together with other shrubs; also on sands, where small barchans pile up around them. — W. Siberia: Alt. (E.); E. Siberia: Ang.-Say., Dau. (W. part). **Gen. distr.:** Mong. (NW part). Described from the Selenga River in Transbaikalia. Type in London.

Economic importance. Cultivated as ornamental. Suitable for prickly hedges.

20. **C. pruinosa** Kom. Monogr. in A. H. P. XXIX, 2 (1909) 265; C. K. Schn. Laubholzk. II (1907) 1014. — C. rupestris M. Pop., Fl. Al'ma-atinsk. zapovedn. (1940) 27, nom. nud.

A strongly spiny shrub, ca. 1 m high; young shoots densely puberulent; annotinous shoots brown, ribbed; old branches yellowish brown or greenish brown, the splitting bark grayish-striped; stipules oval-triangular, spinous-tipped, often persistent; leaves on long shoots with 2 or 3 approximate leaflet pairs, the rachises becoming lignified and persistent as strong straight spines 1–2.5 cm long; leaves on axillary shoots with 2 closely approximate leaf pairs at end of rachis or occasionally more remote, the rachis short, pubescent, deciduous; leaflets pubescent on both sides, glaucescent green, oblanceolate or oboval, 0.5–1 cm long and 1.5–2.5 mm broad, spinous-tipped from an obtuse or acute apex; pedicels 2–2.5 mm long, pubescent; calyx tubular, 10–13 mm long, glabrous or, especially on the teeth, pubescent; teeth one-quarter as long as tube, obtuse or acute; corolla twice as long as calyx; standard 22–27 mm long and 11–15 mm broad, oboval, rather gradually tapering toward base; wings with limb as long as claw, sublinear or somewhat dilated toward apex, the obtuse auricle ca. 1 mm long; keel subtruncate at base, the claw slightly longer than limb; ovary glabrous or hairy; pod 2 cm long and 2.5–3 mm broad. June–July.

Dry stony slopes. — Centr. Asia: T. Sh. (central part, in the Kirghiz and Trans-Ili Ala Tau ranges). **Gen. distr.:** Dzu.-Kash. (Kashgaria). Described from the Kirghiz Ala Tau. Type in Leningrad.

Note. This Tien Shan race replaces in Central Asia the species C. spinosa (L.) DC., from which it differs in smaller pubescent leaflets and shorter spines. In habit it resembles closely C. dasyphylla Pojark. from which it is distinguishable by calyx shape, long-clawed and short-auricled wings, as well as by longer and narrower leaflets.

Series 7. **Tragacanthoides** Pojark. — Calyx tubular, with large acuminate teeth; standard oboval, gradually tapering to a claw; wings with claw as long as limb, and with a long linear auricle; keel with recurved beak, claw as long as limb, and short auricle; pod short, broad, more or less flattened dorsally; leaves pinnate; all leaf rachises on long shoots and mostly those on short shoots becoming indurated and persistent. Besides our species, the series includes C.leucospina Kom.(Kashgaria), C.gerardiana Royle (NW Himalayas), C.kozlovii Kom. and C.roborovskii Kom. (Tibet), C.przewalskii Pojark.(Kansu, Alashan), and C.franchetiana Kom.(Yunnan).

21. **C.hololeuca** Bge.ex Kom.Monogr.in A.H.P.XXIX, 2 (1909) 275; Kryl., Fl. Zap. Sib. VII, 1624. — C.hololeuca Bge.in sched. — C.tragacanthoides var.leucophylla Fisch. et Mey.Enum.pl.nov.a Schrenk lect.(1841) 76, in adnot.

A much branched, spiny and densely leafy shrub, to 50 cm high, with brownish-yellow splitting bark; shoots stout, very densely velutinous when young; stipules triangular, subulate-acuminate, indurescent, persistent, 3—5 mm long; leaves on long shoots pinnate, with 2 approximate pairs of sessile leaflets; leaf rachises stout, tomentose, terminating in a spine 3—4 mm long, soon hardening into strong, often recurved spines 6—12 mm long; rachises on axillary shoots slender, 2—5 mm long, deciduous; leaflets closely approximate, firm, densely white-tomentose on both sides, elongate-oboval, cuneately narrowed at base into petiolule 0.5 mm long, pungent from a rounded or briefly acuminate apex; flowers solitary; pedicels to 2 mm long, articulate at base, tomentose; calyx tubular-campanulate, 9—11 mm long, densely hirsute, the triangular cuspidate teeth 1.5—2.5 mm long; corolla yellow, 20 mm long; standard with a broadly oboval to suborbicular limb tapering into and twice as long as claw; limb of wings subtriangular, strongly dilated toward apex, the claw two-thirds as long, the slender auricle 354 slightly shorter than claw; keel with upcurved beak, the claw as long as limb, the auricle short and rounded; ovary ovaloid, densely woolly; pod half as long again to twice as long as calyx, strongly flattened dorsally, densely woolly; seed angular-oval, dilated, brownish. Fl. May; fr. June.

Dry clayey slopes, hummocky sands, and steppes. — W. Siberia: Alt.; Centr. Asia: Balkh.(only along Black Irtysh River). **Gen.distr.**: Dzu.-Kash. (Koksyn near the Black Irtysh). Described from upper reaches of the Irtysh. Type in Leningrad.

22. **C.tragacanthoides** (Pall.) Poir. in Lam. Encycl. méth. Suppl. II (1811) 90. — Robinia tragacanthoides Pall. in Nova Acta Acad. Petrop. X (1797) 371. — C.tragacanthoides α Pallasiana Fisch. et Meyer, Enum.pl.nov.a Schrenk lect.(1841) 75, in adnot.; Ldb. Fl. Ross. I, 571; Kom. Monogr. in A.H.P.XXIX, 2 (1909) 271; Kryl., Fl. Zap. Sib. VII, 1624. — Ic.: Pall. l. c. tab. VII.

A low, strongly spiny shrub, with brown bark; young shoots stoutish, angled, tomentose; stipules triangular, brown-scarious at base, spinous-pointed, indurescent, persistent; leaves on long shoots pinnatifid, with 2 or 3 pairs of sub-approximate sessile leaflets, the rachis stout, pubescent, very soon becoming indurated and transformed into a strongly recurved spine 8—16 mm long; leaves on short shoots with very closely approximate pairs of leaflets, partly pseudo-digitate, some of the slender rachises deciduous, others persistent as slender spines 5—12 mm long; leaflets narrowly oblanceolate, cuspidate from acuminate apex, 5—12 mm long and 1.5—2 mm broad, appressed-hairy; pedicels 2.5—4 mm long; articulate near base; calyx densely pubescent, 10—12 mm long, tubular; teeth narrowly triangular, subulate-pointed; corolla yellow, 20—22 mm long; standard

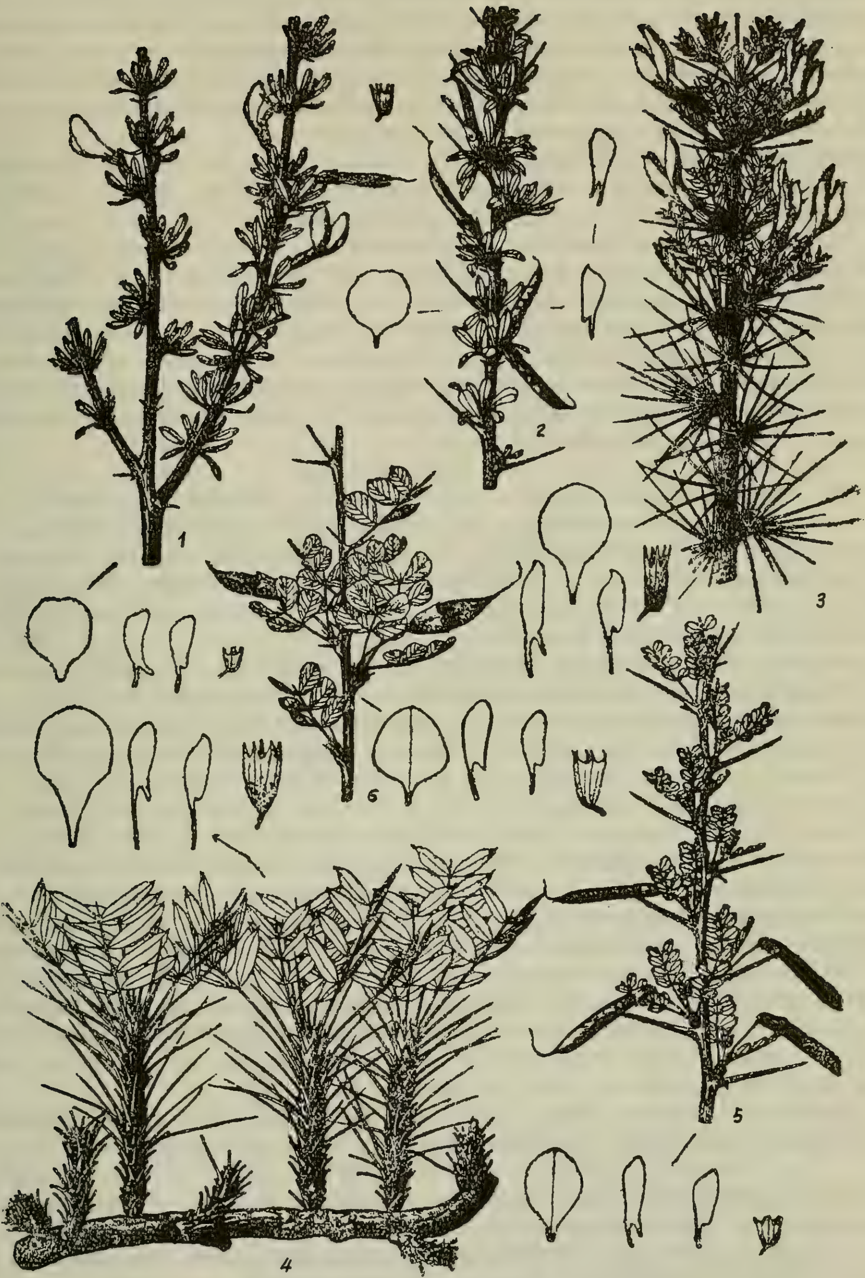

PLATE XXIV. 1 – Caragana leucophloea Pojark., branchlets and flower parts; 2 – C.dasyphylla Pojark., branchlet and flower parts; 3 – C.pleiophylla (Rgl.) Pojark., branchlet and flower parts; 4 – C.laetevirens Pojark., branchlet and flowers parts; 5 – C.bungei Ldb., branchlet and flower parts.

oboval, cuneately narrowing into and about as long as claw; limb of wings dilated at apex or with almost parallel margins, the claw as long as limb, the auricle to 8 mm long; keel slightly shorter than wings, with recurved beak and short rounded auricle, the claw as long as limb; pod densely hairy, approximately twice as long as calyx, broadly cylindric, flattened dorsally, terminating in a hard spine ca. 5 mm long. May.

357 Steppes, stony slopes, and rock crevices. — Centr. Asia: Balkh. (around Lake Zaisan). Endemic. Described from Lake Zaisan. Type in London; topotype (or perhaps cotype?) in Leningrad.

Note. C.tragacanthoides (Pall.) Poir. should apparently be considered as a hybrid C.bongardiana (F. et M.) Pojark. × C.hololeuca Bge., occupying in its characters an intermediate position between these species; size of flower and shape of wings as in C.hololeuca; leaf rachises on long shoots strongly spinescent, on the short shoots very short; they become indurated and persistent, unlike those of C.hololeuca; leaflets, as regards their shape and pubescence, are indistinguishable from those of C.bongardiana.

23. **C.bongardiana** (Fisch. et Mey.) Pojark. in Addenda X, p. 300. — C.tragacanthoides Bong. et Mey. Suppl. fl. Alt. (1841) 18, non Pall. — C.tragacanthoides β bongardiana Fisch. et Mey. Enum. pl. nov. a Schrenk lect. (1841) 75; Ldb. Fl. Ross. I, 571; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 271; Kryl., Fl. Zap. Sib. VII, 1624. — C.tragacanthoides Ldb. Fl. alt. II (1831) 267, non Poir.

A shrub, 50—100 cm high, with light brown, longitudinally splitting bark; shoots rather slender, angled, pubescent; stipules narrowly lanceolate, spinescent, indurescent, persistent; leaflets pinnatifid, mostly with 3 or sometimes 2 pairs of sessile leaflets; leaf rachis slender, hairy, persistent as a slender straight spine, on long shoots to 20 mm, on short shoots 10—15 mm long; leaflets appressed-hairy on both sides, narrowly oboval to linear-oboval, cuspidate from obtusish or acute apex, 7—15 mm long and 1.5—3.5 mm broad; pedicels 1-flowered, rarely 2-flowered, articulate in lower part, 2.5—6 mm long, densely shaggy-tomentose; calyx tubular, 14—17 mm long, shaggy-tomentose on the outside teeth narrowly triangular, spinous-pointed, one-quarter to one-third the length of tube; corolla yellow, 27—30 mm long; standard with broadly oboval limb gradually narrowing to a slightly shorter claw; limb of wings sublinear (3.5 : 1), the auricle half the length of claw, a shorter auriclelike appendage sometimes present on the inner margin; keel with a short recurved beak, the claw markedly longer than limb; ovary villous; fruit unknown.

Slopes and steppes. — Centr. Asia: Balkh. (E. part). **Gen. distr.**: apparently Dzu.-Kash. Described from Lake Zaisan. Type in Leningrad.

24. **C.pleiophylla** (Rgl.) Pojark. in Addenda X, p. 301. — C.tragacanthoides var. pleiophylla Rgl. in Izv. Obshch. lyubit. estestv., antrop., i etnogr. XXXIV, 2 (1882) 19, pro max. parte; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 272. — C.tragacanthoides var. villosa Rgl. l. c.; Kom. l. c., ex parte.

358 A much branched, spiny, densely leafy shrub, 50—100 (200) cm high, with brownish-yellow or grayish-yellow bark; young shoots light-colored, tomentose-villous; stipules triangular-lanceolate, coriaceous and hairy

in lower part, long-spinescent, soon indurescent, persistent; leaf rachises hairy, apiculate, all persistent as straight spines 1.5–4 cm long; leaflets 4–6 pairs, firm, pale green, on both sides appressed-hairy or villous (var. villosa), elongate-oboval to oblanceolate or elliptic, spinous-tipped from usually acuminate apex, cuneate at base, with petiolule 0.75 mm long; pedicels 1-flowered, 5–7 mm long, articulate near base, villous; calyx tubular, 15–21 mm long; teeth narrowly triangular, long-acuminate, pungent, two-fifths to two-thirds as long as tube; corolla yellow, 30–36 mm long; standard with elliptic-oval obtuse limb tapering into 2.5 times as long as claw; wings linear (6–7 : 1), acuminate or obtuse, with a narrow auricle two-fifths to half the length of claw and often with a shorter auriclelike appendage on the inner margin, the limb 1.5 times as long as claw; keel with recurved beak and a short rounded auricle, the claw as long as the limb; ovary villous; pod 2.5 (3) times length of calyx, 30–35 (40) mm long and 5–7 mm broad, hairy. Fl. May; fr. June–July. (Plate XXIV, Figure 3).

Dry, mostly stony mountain slopes, riverbanks and lakeshores. – Centr. Asia: T. Sh., Pam.-Al. (only N. slopes of the Alai Range). **Gen. distr.:** Dzu.-Kash. (Kuldja in Chinese Tien Shan). Described from Lake Issyk-kul'. Type in Leningrad.

Economic importance. May be used as ornamental.

Note. The species differs from other Central Asian representatives of the series C. pleiophylla (Rgl.) Pojark. in greater number of leaflet pairs, leaflet shape, indument, and larger size of flowers. In disjunct situation, the other side of a gap in central China, a different race occurs, namely C. przewalskii Pojark. (C. tragacanthoides var. villosa Kom., ex parte, non Rgl. – C. tragacanthoides var. Pallasiana Maxim., in sched., non Fisch. et Mey.); it is characterized by shorter calyx, shorter spines, fewer leaflet pairs, denser patent indument, and smaller corolla.

Series 8. **Jubatae** Kom. Monogr. (1909) 286. – Calyx large, campanulate-tubular, with conical base; corolla pink; standard with obovate limb gradually tapering into a claw; wings with claw two-thirds to three-quarters as long as limb and a linear auricle; pod short and broad; leaflets 3–6 pairs. Very spiny shrubs as all petioles persist as long slender spines. In addition to our species, this series contains C. tangutica Maxim. from the Lake Koko Nor area and C. hoplites Dunn from Garhwal (NW Himalayas).

25. **C. jubata** (Pall.) Poir. in Lam. Encycl. méth., Suppl. II (1811) 89; Ldb. Fl. Ross, I, 572; Turcz. Fl. baic.-dah. I, 288; O. et B. Fedtsch. Consp. fl. turk. II (1909) 173; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 287. – Robinia jubata Pall. in Nova Acta Acad. Petr. X (1797) 370. – Aspalathus jubatus O. Kuntze, Rev. gen. I (1891) 161. – Ic.: Pall. l. c. tab. VIa; Astrag. tab. 85. Vernacular name: verblyuzhii khvost [camel's tail].

Shrub, either erect, 1–3 (4–5) m high (α erecta Rgl. et Til., Flor. ajan. 76 – forest form), or more or less prostrate and dwarf (β pygmaea Rgl. – a chiefly high-mountain and arctic form), branched from base or with a single main stem arising from the ground; branches long, acinaciformly curved, very sparsely branched, covered with gray or blackish bark, densely leafy and studded with numerous slender long (to 6—7 cm) gray rachises of leaves produced in preceding years; rachis of young leaves shaggy with long white hairs; stipules to 13 mm long, soft-leathery, densely white-villous, broadly ovate-triangular, strongly spinescent. on long shoots imbricated; leaflets 4—6 pairs, 7—24 mm long and 1.5—7 mm broad, dark green, long-hairy, with villous margin, thickish, narrowly elliptic to linear-elliptic, apiculate from obtuse or rarely acutish apex, rounded at base, with petiolule 0.5 mm long; pedicels solitary, 1-flowered, short, articulate at base, 1-bracted; calyx tubular, narrowly conical at base, 14—17 mm long, white-villous, more densely so on the teeth, these lanceolate, acuminate, half as long as tube; corolla pink, rarely almost white, 27—32 mm long; standard broadly oboval, gradually tapering toward base; wing dilated toward apex or sublinear (3.5 : 1), the claw two-thirds to three-quarters as long as limb, the linear auricle three-quarters to half the length of claw; keel obtuse and somewhat recurved at tip, with a short triangular auricle, the claw about as long as limb; pod twice length of calyx, hairy, cuspidate; seeds globose, spotted. Fl. June—July; fr. August—September.

Stony slopes and alpine meadows in the upper mountain zone; in the forest belt mainly on sandy or stony islands and banks in river valleys, in forest margins, and in the shade of coniferous forests.— Arctic: Arc. Sib. (lower reaches of Lena); E. Siberia: Lena-Kol., Ang.-Say., Dau. (W. part);
360 Far East: Okh. (near Ayan); Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), T. Sh., Pam.-Al. (N. slopes of the Alai Range). **Gen. distr.:** Dzu.-Kash., Mong., NW Tibet. Described from the village of Kultuk at the NW extremity of Lake Baikal. Type in London.

Economic importance. Grown for ornament.

26. **C. leatevirens** Pojark. in Addenda X, p. 302.—

A strongly spiny and very densely leafy shrub, with dark gray bark; shoots short, stout, covered throughout with stipules, these large, soft-leathery, ovate, densely clothed with white silky antrorse hairs; leaf rachis similarly vested when young, soon induresc ent and transformed into a stiff slender upright spine 2—3.5 cm long; leaflets 3 or 4 pairs, firm, narrowly elliptic or oblong-oblanceolate, acute, apiculate, shortly cuneate at base, 10—17 mm long and 2—4.5 mm broad, pale glaucescent green, covered on both sides with tightly appressed and, on margin, subpatulous hairs, the petiolules 0.5 mm long; pedicels solitary, not more than 6 mm long, hairy, articulate near base; calyx campanulate-tubular, with conical base, 14—16 mm long and 7 mm broad, more or less hairy outside, the lanceolate acuminate teeth one-third to two-fifths as long as tube; corolla 2.5—3 cm long; standard with oboval limb gradually tapering into a long claw; wings with subtriangular apically dilated limb, the claw at least three quarters as long as to equaling the limb, the narrow spurlike auricle one-quarter to one-third the length of claw; keel with obtuse recurved tip, the auricle very short; fruit, like ovary, with appressed gray hairs, 1.5 times the length of calyx, 20—25 mm long; seeds unknown. Fr. July. (Plate XXIV, Figure 4).

Slopes with xerophytic shrubby to arborescent vegetation.— Centr. Asia: Pam.-Al. (Turkestan Range). Endemic. Described from the Kalaimakhmut River, a tributary of the Sokh River. Type in Leningrad.

Note. In addition to the short wing auricles, the features distinguishing this species from C. jubata Pall. are the light color and firm consistency of the foliage, the silky appressed indument, fewer pairs of leaflets, and the stiffer short spines. The characteristics distinguishing this species from C.hoplites Dunn are the short wing auricles and leaves devoid of prominent veins.

Series 9. **Acanthophyllae** Pojark. — Calyx small, tubular-campanulate, with short teeth; wings slightly longer than keel, with limb 3 times as long as claw and auricle half to two-thirds the length of claw; pod linear (7 : 1); pedicels rather short; leaflets (3) 4 or 5 pairs, small; rachis of leaves on 1 long shoots persistent as a spine, on short shoots deciduous. This series also includes C.decorticans Hemsl. of E.Afghanistan and NW Himalayas.

27. **C.acanthophylla** Kom. Monogr. in A.H.P. XXIX 2 (1909) 311. — C.tragacanthoides β pleiophylla Rgl. (ex parte) et kokanica Rgl. in Izv. Obshch. lyub. estestv., antrop. i etnogr. XXXIV, 2 (1882) 19. — C.tragacanthoides B. Fedtsch. in A.H.P. XXIV (1905) 175, non Poir. — Ic.: Kom. l. c. tab. XIV, 13.

A low, strongly spiny shrub, with gray bark; annotinous shoots light brown, angled, appressed-hairy at first; leaf rachises on long shoots persistent as stout, straight or slightly curved spines 13—23 mm long; stipules also becoming transformed into prickly spines 3—5 mm long; rachises on short shoots slender, 7—20 mm long, distinctly hardening and tardily deciduous but not retained till next growing season; leaves (3) 4 pairs, coriaceous, pale green, with short appressed hairs, on both sides, oboval to narrowly oboval, 4—9 mm long and 2—4 mm broad, shortly spineous-tipped from obtuse apex; petiolules 0.5 mm long; pedicels 1—2 cm long, articulate above the middle; bracteole solitary, very small, setaceous; calyx tubular-campanulate, 6.5—8 mm long, the triangular acute teeth one-third the length of tube; corolla 20 mm long; standard with broadly ovate limb abruptly contracted into and 2.5—3 times as long as claw; limb of wings rather narrow (3 : 1), slightly dilated toward apex, three times as long as claw, the linear auricle two-thirds the length of claw; keel obtusish, the limb 1.5 times as long as claw, the short auricle broadly triangular; ovary glabrous; pod 27—32 mm long and 3—5 mm broad, compressed laterally; seeds elliptic, brown. Fl. April—May, fr. June.

Stony slopes and canyons of mountain streams. — Centr. Asia: Balkh. (left bank of Ili River), Syr D., T. Sh. (W.), Pam.-Al. (N. slope of Alai Range, Mt. Mogol-tau). **Gen. distr.**: Dzu.-Kash. Described from the Alai Range. Type in Leningrad.

Note. In the S. part of the Pamir-Alai system, the series Acanthophyllae is apparently represented by a distinct species, very closely related to C.acanthophylla Kom., as far as may be deduced from the single specimen found on the S. slope of the Gissar Range in the Tupalang River-basin (Chash village), which differs clearly from C.acanthophylla in its acute spinous-tipped, prominently veined leaflets. The plant was collected after flowering, with immature fruits, and this precludes the possibility of obtaining a complete picture. We designate it provisionally as C.hissarica Pojark. sp. nov.

362 Series 10. **Arborescentes** Kom., Monogr. (1909) 321 (pro subserie). — Calyx small, broadly campanulate, with very short broad teeth; wings longer than other petals, with limb 1.5–2.5 times as long as claw, the spurlike auricle $^2/_7$ – $^2/_3$ the length of claw; pod linear (5–8 : 1); pedicels elongated; leaflets (3) 4–8 (10) pairs; leaf rachis deciduous as a rule (only in C. turkestanica occasionally persistent). Besides our species, the series contains 6 species distributed throughout N. China and Manchuria.

28. **C. arborescens** Lam. Encycl. meth. I (1783) 615; Ldb. Fl. Alt. III (1831) 263; Ej. Fl. Ross. I, 569; Turcz. Fl. Baic.-dah. I, 286; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 321; Kryl., Fl. Zap. Sib. VII, 1625. — Robinia caragana L. Sp. pl. (1753) 722. — Caragana sibirica Medik. Vorles. Chrupf. Phys. Ges. II (1787) 368. — C. inermis Moench, Meth. (1794) 135. — C. caragana Karsten, Fl. Deutsch. II (1880–1883) 258. — Robinia altagana Pall. Fl. Ross. I, 1 (1784) 68 (ex parte). — Aspalathus caragana O. Ktze. Rev. gen. I (1891) 161. — Ic.: Pall. Fl. Ross. I, tab. XLII, f. centr.; Syreishch., Mosk. Fl. II (1907), Figure on page 302; Hegi, Fl. v. Mitteleur. IV, 3 f., 1457. Vernacular names: chernaya [black] karagana, chiliga, zheltaya akatsiya [yellow acacia].

A tall shrub or tree, 2–5 (7) m high, rarely a rather low shrub (β fruticosa Dipp. Laub.-holz. III (1893) 709 = Robinia altagana var. fruticosa Pall. l. c.), with smooth, greenish-gray, shining bark; shoots slender, soft, mostly appressed-hairy when young, greenish or brownish; stipules subulate, mostly slender, deciduous, rarely persistent, becoming thickened and woody, to 10 mm long; leaf rachises mostly pubescent, slender, canaliculate, bristle-tipped, deciduous, to 9 cm long; leaflets 4–7 pairs, broad-elliptic to oblong-elliptic or ovate, rounded at both ends or broadly cuneate at base (C. arborescens var. α fruticosa Dippel, Laubholzk. III (1893) 709), mucronate, 8–35 mm long and 5–13 mm broad, more or less hairy when young, later glabrescent (f. typica C. K. Schn.), or densely silky-pubescent when young, with antrorse hairs and more or less hairy in maturity (f. sericea Kryl.); pedicels mostly 1-flowered, rarely 2-flowered, mostly in fascicles of 2–5, rarely solitary, 2–6 cm long, articulate in upper part, pubescent, especially at and above the joint; bracteole very small, setaceous; calyx campanulate, pubescent, especially on the margin, 6 mm long, the short broad teeth $^1/_6$ the length of tube; corolla 3 times length of calyx; standard 17–19 mm long and about as broad, the broad limb abruptly contracted into a short claw; wings slightly longer than standard, slightly attenuate in upper part, the limb 1.5 times as long as claw, the spurlike auricle $^2/_7$ – $^1/_3$ the length of limb; keel slightly shorter than standard, obtuse, with a broad triangular auricle, the claw very slightly shorter than limb;
363 ovary glabrous or pubescent; pod linear-cylindric, 3.5–6.5 cm long and 3.5–5 mm broad, with 5–8 grayish-yellow or brownish seeds. Fl. May–June; fr. from July.

Riverbanks, sands and pebbles, open forests and forest edges, slopes of gullies, and stony slopes and rocks, in the forest belt; rarely occurring on the periphery of the steppe belt and there, for preference, in shady habitats. — W. Siberia: Ob, to 61°N. lat., Irt. (E. part), Alt.; E. Siberia: Ang.-Say. (S. part, eastward to Irkutsk); there is a dubious report for Dau., where C. arborescens is clained to spread as far as Nerchinsk; Centr. Asia: Balkh. (NW part). Gen. distr.: Mong. (NW part). Described from Siberia. Type in Paris.

Economic importance. Very widely cultivated as ornamental; used for hedges, individual planting, and afforestation in the South. Cultivated since 1752 and known in a number of forms; f. pendula Dipp., grown on a bole, with numerous twiggy, weeping branches hanging down from the top; f. albescens Boiss., with white-variegated leaves; f. lutescens Zbl., yellow-variegated; f. lorbergii Koehne, with linear leaflets 1–2 (rarely to 4) mm broad; f. sophoraefolia Dipp. (C. sophoraefolia Bess.), more or less linked genetically with hybrids of C. arborescens Lam. C. microphylla Lam., with small, elongated rigid leaflets. The best fibers of C. arborescens shoots are used for cordage. The leaves contain a blue pigment. The seeds contain 12.4% of fatty oil and are used as bird food; in famine years they were used as human food. The flowers yield nectar for bees.

Note. A species displaying considerable variability in respect of various characters, such as number of flowers, indument, leaf shape (lusus typica Kom., obovata Kom., acuta Kom., and angustifolia Kom.), as well as plant size and habit. Deserving of note and observation in natural conditions are some of the morphologically most strikingly deviating forms associated with dry rocky slopes: γ dubia Kom. Monogr., 328 (C. ambigua Kom. in sched. – C. microphylla Ldb. Fl. alt. III, 262, non Lam.; Kryl., Fl. Alt., 230), with very small, firm, broad leaflets, and robust shoots beset with numerous spinescent stipules; this is a low shrub occurring in the Chuya Steppe. Another form, δ martjanovii Kom., differing chiefly in narrower leaflets, was collected in several places on rocky banks of the Yenisei.

29. **C. fruticosa** (Pall.) Bess. Cat. pl. hort. Cremen. (1816) 116; Kom. Monogr. in A.H.P. XXIX, 2 (1909) 333; Kom. and Alis., Opred. rast. Dal'nevost. kr. II (1932) 671. – Robinia altagana var. fruticosa Pall. Fl. Ross. I (1784) 69, ex parte, non Poir. – Caragana redowskii Fisch. in sched.; DC. Mém. Fam. Legum. (1825) 94. – C. redoffski Kirchn. Arb., Musc. (1864) 385. – C. arenaria Loud. Arb. II (1844) 631. – C. altagana Rupr. in Mél. biol. II (1858) 535; Maxim. Prim. fl. amur. (1859) 80, 470. – C. arborescens var. amurensis Maxim. in sched. – C. microphylla γ manshurica Kom. in A.H.P. XXII, 2 (1904) 582. – C. manshurica Kom. Monogr. in A.H.P. XXIX, 2 (1909) 336. – Ic.: DC. l. c. f. 45; Kom. Monogr. tab. XVI.

A shrub to 2 m high, often lower, much branched, densely leafy, with grayish-green bark and brown glabrous shoots; stipules mostly muticous, rarely prickly, deciduous; petioles 7–10 cm long, slender, glabrous, rarely sparsely hairy in lower part when young; leaflets 4–6 or 4–8 pairs, thin, at first sparsely hairy on the margin and on the veins beneath, finally glabrous, oboval with cuneate base, bristle-tipped from truncate or emarginate apex, 1.5–2 cm long and 0.5–12 mm broad, on sterile shoots to 2.7 cm long and 15 mm broad; pedicels 1-flowered, rarely in pairs, articulate in upper part and pubescent above the joint, often glabrous below; calyx rather sparsely soft-pubescent, 6–7.5 mm long; teeth broad, often almost flat, the margin tomentose-ciliate; standard 16–20 mm long, broadly oboval or rounded-oboval, tapering to a short claw; wings exceeding standard by 2–3 mm, slightly attenuate toward apex, the limb 1.5 times as long as claw, the auricle $^2/_7 - ^2/_5$ the length of claw; keel 2–4 mm shorter than standard, with claw about as long as limb, the base of limb with a broad obtuse tooth, rarely truncate or even cuneate (C. manshurica Kom.); ovary always glabrous; pod 2–4.5 cm long and 4–5 mm broad; seeds brown. Fl. end of May–June; fr. July–August.

Broadleaf riverside woods, rocky and stony escarpments and slopes, among arborescent and shrubby vegetation.— Far East: Ze.-Bu., Uda (S. part – Gorin River), Uss. **Gen. distr.**: Jap.-Ch. (N. Manchuria, very rare). Described from a cultivated specimen. Type in Kiev.

A species closely resembling C. arborescens and sometimes not easily distinguishable from it; it is characterized by scant indument on all parts, notably on petioles, some often glabrous from the beginning, pods shorter than in C. arborescens, leaflets always cuneate, and pedicels usually solitary or twin.

30. **C. turkestanica** Kom. Monogr. in A. H. P. XXIX, 2 (1909) 314; B. Fedch., Rast. Turk. (1915) 514.— C. decorticans Lipsky in A. H. P. XVII (1901) 22, non Hemsl.; O. et B. Fedtsch., Consp. fl. turk. II (1906) 174.— C. arborescens Rgl. in sched., non Lam.— Ic.: Kom. l. c., tab. XIV; Fl. Tadzhik. V (1937) f. 21.

A much branched shrub, 1–2 m high, sometimes slightly higher, with gray or greenish-gray bark; young shoots slender, glabrous or appressed-hairy; 365 annotinous shoots light brown or greenish brown; stipules either deciduous or persistent as mostly horizontally spreading subulate spines 2.5–10 mm long; leaf rachises 1.5–6 cm long, apiculate, mostly deciduous, rarely (among plants of the Gissar Range) persistent as slender and brittle or else stout spines; leaflets (2) 3–5 pairs, glabrous or sparsely appressed-hairy, rather inconspicuously veined, 5–23 mm long and 3–15 mm broad, mostly oboval or elliptic, apiculate from rounded to truncate apex, cuneate or very rarely rounded at base; pedicels 2–5 mm long, articulate above the middle, glabrous bracteoles very small, setaceous; calyx campanulate, 6–8 mm long and nearly as broad; teeth little developed, with a broad and almost flat triangula base, abruptly terminating in a prickle ca. 1 mm long, glabrous above, ciliate on the margin; corolla 3–3.5 times length of calyx; standard 24–27 mm long, the limb 22–25 mm broad, abruptly contracted into a short claw; wings 27–30 mm long, exceeding standard and keel, the limb dilated toward apex, 2.5 times as long as claw, the linear auricle one-third to half the length of claw; keel 23–27 mm long, obtuse, with a short obtuse auricle, the claw two-thirds as long as the limb; ovary glabrous; pod linear 3–5 cm long and 6–6.5 mm broad; seeds dull, brown, with black dots and stripes. Fl. June; fr. July.

Mountain slopes and gorges, in thickets of more or less xerophytic woody vegetation, at altitudes between 1,000 and 2,500 m.— Centr. Asia: T. Sh. (only W., including Fergana Range), Pam.-Al. (from Zeravshan to Darvaz). **Gen. distr.**: Dzu.-Kash. (Kuldja). Described from Soviet Central Asia. Type in Leningrad.

31. **C. praini** C. K. Schn. in Bull. Herb. Boiss., 2 sér. VII (1907) 313; Ej. Laubholzk. II (1907) 97; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 313.— C. arborescens Prain in Journ. Asiat. Soc. Bengal. (1897) 372, non Lam.; Boiss. Fl. or. Suppl. (1888) 173.— Ic.: C. K. Schn. Laubholzk. II, f. 59 r-s[2].

A tall, much branched shrub, with shining brownish-yellow bark; shoots erect, rather short, initially appressed-hairy; stipules on the long sterile shoots partly deciduous and partly persistent as short stout subulate ascending spines 2.5–8 mm long; leaf rachis slender, pubescent, mostly deciduous, 10–25 mm long; leaflets 3 or 4 pairs, 5–12 cm long and 3–6.5 mm broad, thin but firm, elongate-oboval, cuspidate from obtuse or truncate apex, green, on both sides with appressed hairs visible with a lens, prominently veined; pedicels solitary or in pairs, slender, (10) 13–18 mm long, articulate above the middle; bracteoles 1–1.75 mm long, filiform; calyx campanulate, 6–7 mm long and as broad, glabrous; teeth broadly triangular, often almost flat at base, with tomentose-ciliate margin, pungent; corolla three times as long as calyx; standard 22–27 mm long, the rounded-ovate limb abruptly contracted into and twice as long as claw; wings exceeding standard by 3–4 mm, the apically somewhat dilated limb one-third to two-fifths the length of claw; keel shorter than other petals, 19–23 mm long, the limb obtuse and slightly reflexed at tip, the claw two-thirds as long as the limb, the auricle short and obtuse; ovary glabrous; fruit unknown. May.

Stony slopes.— Centr. Asia: Pam.-Al. (known only from the Darvaz Range). **Gen. distr.**: Ind.-Him. (E. Afghanistan). Described from the Kurram River in E. Afghanistan. Type in Vienna; cotype in Leningrad.

Note. A specimen from Darvaz in the BIN Herbarium, identified by V. L. Komarov as C. praini, displays the features which distinguish this species from C. turkestanica: brownish-yellow bark, twin pedicels, as well as such characteristics of flower structure as longer wing claw and shorter auricle (this not only relatively but also absolutely).

Series 11. **Bungeanae** Pojark.— Calyx 10 mm long, conical at base; standard with a broad limb tapering into a short claw; wings with limb twice as long as claw and a short spurlike auricle; pod three times as long as broad; petioles deciduous; leaflets 2–4 pairs, thickish. One species.

32. **C. bungei** Ldb. Fl. Alt. III (1831) 264, Icon. pl. Fl. Ross. V, tab. 464; Ej. Fl. Ross. I, 569; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 317; Kryl., Fl. Zap. Sib. VII, 1625.— Aspalathus bungei O. Ktze. Rev. gen. pl. I (1891) 161.— Mongolian name: ukhyr'-khargana ["cow-caragana"].

A much branched, spiny shrub, to 1.5 m high, with grayish-yellow or greenish-yellow bark; young shoots appressed-hairy; annotinous pale yellow; stipules on long shoots persistent as rather stout firm straight or more or less recurved spines 5–15 mm long, on short shoots mostly deciduous; leaf rachis 10–30 mm long, cuspidate, mostly indurescent and persistent for some time after leaf fall but not overwintering; leaflets 2–4 pairs, firm, prominently veined, inconspicuously appressed-hairy on both sides, oboval, cuspidate from slightly emarginate or truncate apex, 1–2 cm long and 0.5–1 cm broad; pedicels solitary, rarely in pairs, hairy, 12–20 mm long, mostly articulate above the middle, rarely at the middle or below; calyx sparingly pubescent outside, campanulate-tubular, 10 mm long; teeth broadly scarious, with tomentose-ciliate margins, spinous-tipped, one-quarter as long as tube; corolla yellow; standard 19–21 mm long and 15–20 mm broad, the broadly ovate to suborbicular limb tapering into and 3 times as long as claw; wings slightly exceeding standard, with limb twice length of claw or slightly more, the spurlike auricle 2–2.5 mm long; keel about equaling standard, with claw slightly shorter than limb and a short obtuse auricle; ovary glabrous; pod 18–21 mm long and 6–7 mm broad, broadly linear, acuminate, 1–3-seeded. Fl. May–July; fr. July–September. (Plate XXIV, Figure 5).

Desert steppes and desert-steppe valleys of mountain streams, mostly on gravelly declivities, rocky outcrops, and sands; in dry steppes sometimes forming large thickets. – W. Siberia: Alt. (SE); E. Siberia: Ang.-Say. (W part– Usinskie steppes). **Gen. distr.:** Mong. (W. part). Described from Altai. Type in Leningrad.

Note. All specimens from Soviet territory have slightly pubescent leaf rachises and leaflets, and sparsely hairy calyx (var. viridis Korsh.). A form occurring in Mongolia, with silvery-tomentose leaflets and densely woolly calyx (var. sericea Korsh.) is unknown in the USSR.

Series 12. **Microphyllae** Kom. Monogr. in A. H. P. XXIX, 2 (1909) 344 (pro subserie). – Calyx campanulate-tubular, the subulate teeth one-third as long as tube; limb of standard abruptly contracted into a short claw; wings with limb 1.5 times as long as claw and a short spurlike auricle; pod linear, 7–8 times as long as broad; leaf rachis deciduous; leaflets 5–10 pairs, small.

Apart from our species, this series includes C. korshinskii Kom. in Alashan and Ordos and C. potanini Kom. in Shansi Province.

33. **C. microphylla** (Pall.) Lam. Encycl. meth. I (1783) 615; Ldb. Fl. Ross. I, 568; Turcz. Fl. baic.-dah. I, 285; C. K. Schn. Laubholzk. II (1907) 97; Kom. Monogr. in A. H. P. XXIX, 2 (1909) 344. – Robinia altagana var. minima davurica Pall. Fl. Ross. I, 1 (1784) 68. – Robinia microphylla Pall. spec. Astragal. (1800) 116. – Caragana altagana L'Herit. Stirp. nov. (1784) 159. – Aspalathus microphyllus O. Ktze. Rev. gen. I (1891) 161. – C. microphylla var. dahurica Kom. in A. H. P. XXII (1904) 582. – Ic.: Pall. Fl. Ross. I, tab. XLII, f. laterales.

Shrub, to 1m, but mostly lower, with yellowish-gray bark on old branches and pale yellow on annotinous shoots; branches erect or curved, often ascending; stipules on long shoots persistent as usually recurved woody spines 3–10 mm long; leaf rachis at first appressed-hairy, at length glabrous, becoming markedly indurated and persistent for some time after 368 the shedding of leaflets but not overwintering, more or less appressed and upright, 1.5–6 mm long; leaflets 5–10 pairs, oboval or subelliptic, 3–10 mm long and 1.75 mm broad, shortly spinescent from obtuse or truncate apex, appressed-sericeous when young (δ pallasiana Kom.), later sparsely and obscurely hairy; pedicels 1–3 mm long, articulate above the middle; calyx campanulate-tubular, puberulent, 9–12 mm long and 5.5–7 mm broad; teeth approximately one-third as long as tube, acuminate and spinescent from broadly triangular base, with tomentose-ciliate margin; corolla 2.5 times as long as calyx; standard 23–25 mm long, the rounded-ovate or rhombic-ovate limb abruptly contracted into and 3–3.5 times as broad as claw [?]; wings scarcely exceeding standard, with limb 1.5 times as long as claw, the spurlike auricle $^{1}/_{5}-^{2}/_{9}$ the length of claw; keel markedly shorter and narrower than wings, obtuse, sometimes slightly recurved, the limb as long as claw, mostly exauriculate and truncate at base; ovary glabrous; pod flat, linear, acuminate, 4–5 cm long and 5–7 mm broad; seeds blackish, oblong-reniform. Fl. June–July; fr. September.

Sandy, gravelly, and stony steppes, thicket-forming; barchan sands, stony slopes, taluses, and exposed dry slopes. – E. Siberia: Irt. (vicinity of Irkutsk and Kultuk), Dau. (except E. part). **Gen. distr.**: Mong. (E.), Jap.-Ch. (Kalgan, Shensi Province). Described from Transbaikalia. Type in London.

Economic importance. Thickets of C. microphylla are of considerable economic importance as forage. The plant is ornamental. Cultivated in the USSR since 1861. Several horticultural forms have been described: f. glomerata hort., f. arenaria hort., and f. megalantha C. K. Schn. – all evolved from seed of Transbaikal origin.

Genus 806. **CALOPHACA** * FISCH. **

Fisch. ex DC. Prodr. II (1825) 270

Flowers yellow, often darkening in drying, large; calyx tubular-campanulate, with 5 lanceolate acute teeth, subtended by 2 bracteoles; stamens diadelphous; ovary sessile; style scabrous, glabrous at summit; pods oblong-cylindric, hairy, stipitate-glandular, 1-celled, 2-valved, the valves curling up in maturity; calyx persistent; seeds reniform, 3–6 mm long. Shrubs or shrublets; leaves imparipinnate; leaflets 3–13 pairs, coriaceous, entire; stipules carious-leathery; inflorescence a many-flowered long-peduncled raceme, with scattered or crowded flowers.

The genus consists of five species, of these four distributed in the mountains of Central Asia, the fifth along the Volga, between the Volga and the Don to N. Caucasus.

Economic importance. All species of the genus Calophaca are large-flowered ornamental shrubs, recommended for cultivation. The large seeds are used as feed. Fibrous plants.

Note. Species of Calophaca can also be distinguished by anatomical characters (see paper by A. Borisova in Tr. Bot. Inst. Akad. Nauk, ser. V, No. 1 (1938) 35–42), since they differ in the position and structure of fiber clusters and in the arrangement of fibers.

1. Standard pubescent on outer surface . . . . 2.
+ Standard glabrous . . . . 4.
2. Plants covered with short subpatent yellowish hairs or sparse short appressed grayish hairs; bracteoles linear; rachis of inflorescence and calyx mostly stipitate-glandular . . . . 3.
+ Plants covered with appressed silvery hairs; bracteoles ovate; rachis of inflorescence and calyx eglandular . . . . 3. **C. howenii** Schrenk.
3. Inflorescence capitate, with crowded flowers; leaflets 4 or 5 pairs, obscurely appressed-puberulent, glaucous (W. Tien Shan) . . . . 2. **C. tianschanica** (B. Fedtsch.) Boriss.

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* From Greek kalos – beautiful and phaca – legume

** Treatment by A. G. Borisova

+ Inflorescence a loose raceme; leaflets 6–8 pairs, yellowish with dense soft hairs (between Lower Volga and Don) . . . . **1. C. wolgarica** (L. f.) Fisch.

4. Leaflets (7) 10–13 pairs, oblong-oval or broadly oblong, 10–26 mm long; rachis of inflorescence and calyx glandular-hairy . . . . **4. C. grandiflora** Rgl.

+ Leaflets 6–8 pairs, rounded-oval, 5–9 mm long; rachis of inflorescence and calyx eglandular. . . . . **5. C. sericea** B. Fedtsch.

Series 1. **Pubiflorae** Boriss. — Standard pubescent outside.

1. **C. wolgarica** (L. f.) Fisch. Cat. hort. Gorenk. ed. 2, LXVII (1812); DC. Prodr. II, 270; Ldb. Fl. Ross. I, 573; Shmal'g., Fl. I, 258; Fl. Yugo-Vost. 5, 585. — Cytisus an nigricans (non C. nigricans L.) Pall. Reise (1776) 754. — C. wolgaricus Linn. f. Suppl. (1781) 327. — C. pinnatus Pall. Fl. Ross. I (1784) 73. — Calophaca nigricans B. Fedtsch. in A. H. P. XXIV (1905) 178; Fedtsch. O. et B. Consp. Fl. Turk. 2 (1909) 176. — Colutea wolgarica Lam. Enc. I (1783) 353. — Adsnocarpus wolgensis Spreng. Syst. II (1826) 226. — Ic.: Pall. Reise, tab. G. f. 3 A; Pall. Fl. Ross. tab. 47; 370 Borissova in Acta Inst. Bot. Ac. Sc. USSR, sér. 1, fasc. 1 (1933) 136, f. 1; l. c. (1938) sér. V, f. 1, fig. 1, 2, 3; Fl. Yugo-Vost., No. 2 (1931), Fig. 447.

Shrublets 20–100 cm high, branched from the very base; young stems densely yellowish-pubescent with short woolly spreading hairs, the rachis of inflorescence stipitate-glandular; old stems with brown bark; leaves 5–6 cm long; leaflets 6 or 7 (8) pairs, rounded-oval, obtusish to acutish, obscurely mucronate or muticous, rounded at base, 3–13 mm long and 3–10 mm broad, coriaceous, woolly-puberulent beneath, more sparsely pubescent above, prominently veined; stipules narrowly lanceolate, 6–10 mm long, sparsely hairy; inflorescence an elongated raceme of 4–8 scattered flowers; peduncles ca. 10 cm long, exceeding leaves, glandular-pubescent; flowers 2–2.5 cm long; pedicels 2–3 mm long; bracts triangular-lanceolate, acute; bracteoles at base of calyx linear, mostly densely glandular-pubescent, divided to the middle into lanceolate acuminate lobes; corolla twice as long as calyx; standard pubescent on the outer surface, emarginate, the rounded limb twice as long as the broad claw; wings slightly shorter than standard, the limb nearly three times as broad in upper part as at base and twice as long as the claw; keel about equaling wings, the limb 1.5 times as long as claw, enlarged in upper part; pod 2–3 cm long, glandular-hispid, linear-cylindric, acute; seeds dark brown, 3–4 mm long and 2–3.5 mm broad. Fl. May–July; fr. July–August.

Steppe plots, declivities, and stony soils. — European part: L. Don (Lugansk, Rostov, and districts), L. V. (Ergeni Hills, vicinities of Krasnoarmeisk, Stalingrad [Volgograd], Astrakhan). Endemic. Described from the Volga (Fischer). Type in Leningrad.

Note. Specimens from the vicinities of Voroshilovsk and Novocherkassk were erroneously identified as C. howenii on account of eglandular or scantily glandular inflorescence rachis and calyx. Considering the patent indument and the linear bracts, these specimens should be referred to C. wolgarica.

The reports concerning the occurrence of C.wolgarica Fisch. near Syzran (Taliev) and in the S. part of the former Buguruslan County (Taliev and Voinovskii) are dubious, being unconfirmed by any herbarium material or references to any other source.

2. **C.tianschanica** (B. Fedtsch.) Boriss. in Acta Inst. Bot. Ac. Sc. USSR, sér. 1, 1 (1933) 137. — C.nigricans B. Fedtsch. var. tianschanica B. Fedtsch. in A. H. P. XXIV (1905) 177. — C.wolgarica Fisch. var. tianschanica M. Pop. in Sched. Herb. Fl. As. Med. XI (1927) 8. — Ic.: Borissova l. c., f. 2; l. c. (1938) sér. V. 1, fig. 4, 5, 6. — Exs.: Herb. Fl. As. Med. No. 258 (sub C.wolgarica (L. f.) Fisch.).

Shrub 20—50 cm high, branched from the base; stems sparsely puberulent, the young branches glandular-hairy; leaves 3—5 cm long; leaflets 4 or 5 (6) pairs, orbicular to rounded-oval, mucronate, rounded at base, 3—10 mm long and 3—8 mm broad, prominently dark-reticulate beneath, coriaceous, obscurely appressed-puberulent, glaucous; stipules narrowly lanceolate, 4—5 mm long, pubescent chiefly in lower part, membranous; inflorescence short, capitate, with 7—8 (12) twisted flowers; peduncles glandular-pubescent, exceeding leaves; flowers 1.5—2 cm long; pedicels 3—4 mm long; bracts triangular, acute, pubescent; bracteoles linear; calyx densely covered with white hairs interspersed with glandular dark purple ones, divided to the middle into lanceolate acute lobes; corolla yellow, twice as long as calyx; standard pubescent outside, the orbicular emarginate limb 4 times as long as claw; wings slightly shorter than standard, the limb twice as broad at summit as at base, 2.5 times as long as claw; keel about equaling wings, the limb 1.5 times as long as claw; pod ca. 3 cm long, covered with dark purple glandular bristles especially on the back, lance-cylindric, enlarged toward apex, acute; seeds 3—4 mm long and 2—3 mm broad, ovaloid, glabrous and smooth, brown. Fl. May—June; fr. June—July. (Plate XXV, Figure 1).

Steppe mountain slopes. — Centr. Asia: T. Sh. (W. part — Ugam, Chatkal, Chimgan, and Tashkent Ala Tau ranges). Endemic. Described from the Chimgan Range. Type in Leningrad.

3. **C.howenii** Schrenk, Enum. pl. nov. (1841) 74; Ldb. Fl. Ross. I, 573; Fedtsch. O. et B. Consp. Fl. Turk. 2 (1909) 176; Shmal'g., Fl. II, 253. — C.soongorica Kar. et Kir. in Bull. Soc. Nat. Mosc. (1841) 401. — Ic.: A. Borissova in Acta Inst. Bot. Ac. Sc. USSR, sér. 1, 1 (1933) f. 3; l. c. (1938), sér. V, 1, fig. 7, 8, 9.

Shrub, 20—100 cm high, branched from base; young stems sericeous-puberulent, glabrescent in age, yellowish, with splitting bark; leaves 3—7 cm long; leaflets 3—5 pairs, orbicular to rounded-oval, 4—13 mm long and 3—10 mm broad, pruinose, prominently reticulate-veined on both sides, obscurely appressed-puberulent, obtuse to obscurely acutish, rounded at base, subsessile; stipules linear-lanceolate, ca. 8—10 mm long, membranous, scantily pubescent; inflorescence a raceme with 5—8 scattered flowers; peduncles exceeding leaves, densely villous-pubescent, eglandular; flowers 2.5 cm long, on pedicels 2—3 mm long; bracteoles ovate; calyx densely appressed-sericeous, the triangular-lanceolate acute teeth about half length of calyx; corolla darkening on drying, about 2.5 times as long as calyx; standard pubescent on outer surface, the orbicular emarginate limb 4 times

(373)

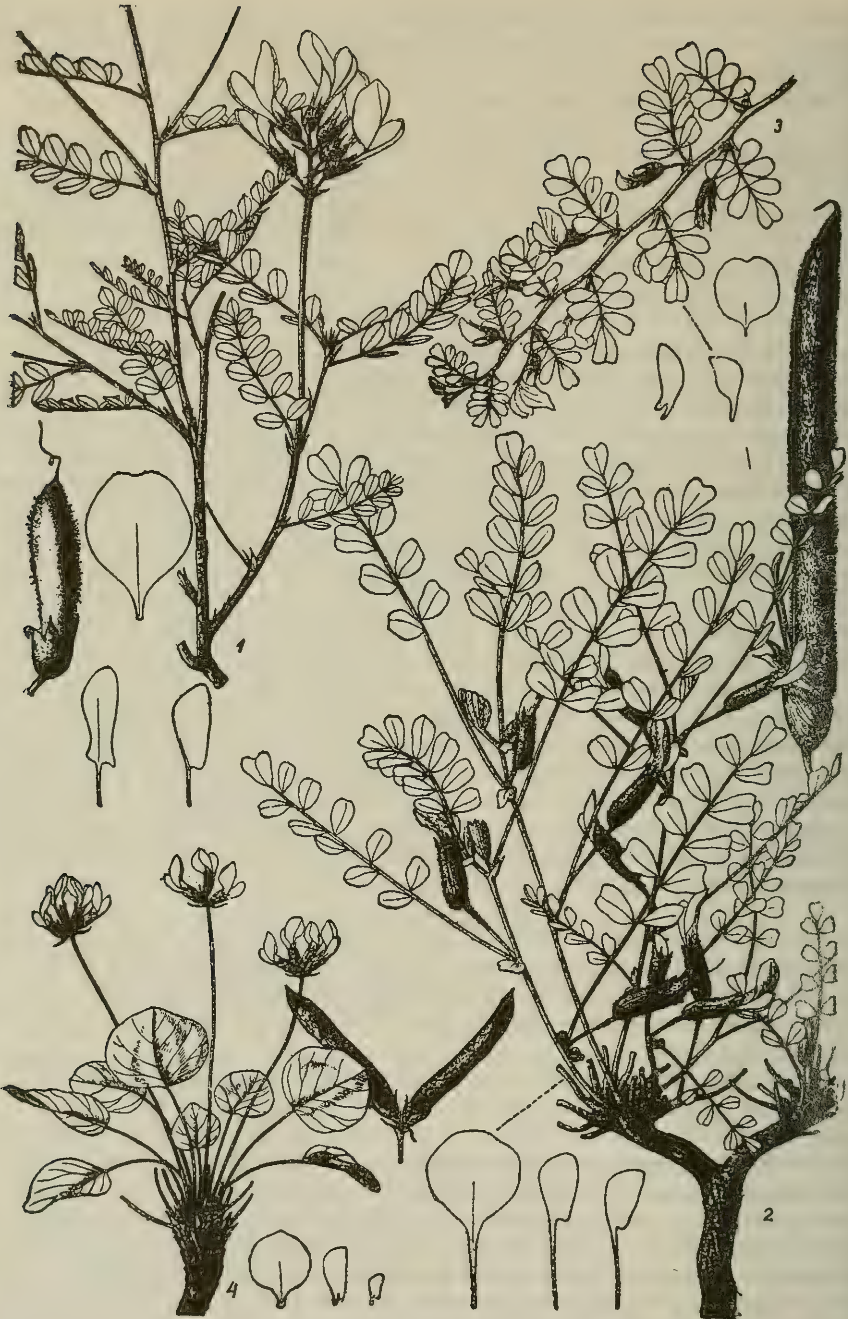

PLATE XXV. 1 – Calophaca tianschanica Boriss., branchlet with flowers, pod, flower parts; 2 – Chesneya kopetdagensis Boriss., aspect, pod, flower parts; 3 – C. ferganensis Korsh., portion of the plant, flower parts; 4 – Gueldenstaedtia monophylla Fisch., aspect, pods, flower parts.

as long as claw; wings slightly shorter than standard, the oblong limb twice as long as claw; keel shorter than wings, the limb twice as long as claw; pod 2–3.5 cm long, glandular-hispid, especially on dorsal side, and pubescent, linear-cylindric, pointed at summit, 1-celled, the valves twisted in maturity; seeds blackish brown, smooth, glabrous, reniform, 4–6 mm long and 3–4 mm broad. Fl. May–June; fr. July–August.

Mountain slopes, in steppe associations. – Centr. Asia: Dzu.-Tarb. (Tarbagatai Range, Ayaguz). **Gen. distr.**: Dzu.-Kash. (Chinese Dzungaria). Described from Ayaguz (Shrenck). Type in Leningrad.

Note. Specimens from Chinese Dzungaria have smaller pods and leaflets.

Series 2. **Glabriflorae** Boriss. – Standard glabrous.

4. **C. grandiflora** Rgl. in A. H. P. IX (1886) 607 et in Gartenflora (1886) 517; Fedtsch. O. et B. Gonsp. Fl. Turk. 2 (1909) 176. – C. hispida Rgl. in schedis. – Ic.: Rgl. in Gartenflora l. c. tab. 1231; A. Borissova in Acta Inst. Bot. Ac. Sc. USSR, sér. 1, 1 (1933) f. 4; l. c. sér. V, (1938) f. 1, f. 10, 11, 12; Tr. Tadzh. bazy, IV (1937) tab. 22.

A branched shrub to 1.5 m high; leaves and annotinous shoots clothed with soft hairs; stipules broadly lanceolate, acuminate, 8–20 mm long, pubescent; leaves 6–14 (20) cm long, short-petioled; leaflets (7) 8–13 pairs, oblong-oval to broadly oblong, (10) 15–24 (26) mm long, mucronate, softly appressed-pubescent on both sides; peduncles mostly exceeding leaves, (8) 10–15 cm long, angled-sulcate, pubescent and glandular-hispid, more profusely so in upper part; inflorescence a raceme 12–16 cm long, loosely 10–15-flowered; pedicels glandular-pubescent, 5–9 mm long; bracteoles linear; 3–5 mm long; 5 calyx 12–15 mm long, pubescent as well as glandular-hispid; teeth broadly lanceolate, acuminate, somewhat longer than tube; corolla yellow; standard 2.5–2.8 cm long, equaling to slightly exceeding wings and keel, the rhombic-orbicular limb abruptly contracted into a short claw; limb of wings broadly oblong, rounded-obtuse, 2.5 times as long as the curved claw; limb of keel twice as long as claw, dorsally gibbous, slightly concave on the inner side; ovary hairy, sessile; pod 4.5–5.5 cm long, pubescent as well as glandular-hispid; seeds oval-oblong, 7–9 mm long and ca. 4 mm broad, smooth, brown. Fl. May–June; fr. July–August.

Mountain slopes in lower part of wood-and-shrub woody vegetation zone, at altitudes of 1,400–2,200 m, mostly on stony melkozem dry southern slopes, occasionally occurring on red clays. – Centr. Asia: Pam.-Al. (Gissar, Darvaz, and Gazimailik ranges). Endemic.

Economic importance. The bark is used by local population for making of coarse cordage.

5. **C. sericea** B. Fedtsch. ex A. Borissova in Acta Inst. Bot. Ac. Sc. USSR, sér. 1, 1 (1933) 139. – Ic.: A. Boriss., l. c. f. 5; l. c. sér. V, f. 1 (1938) fig. 13, 14, 15.

Shrub, with glaucescent bark and fascicled leaves; young shoots and leaves silvery silky-pubescent; leaves 8–10 cm long, the short slender petiole pubescent like the leaf rachis; leaflets 6–9 pairs, rounded-oval, 5–10 cm long, obscurely mucronate, veinless except for midrib; stipules triangular-lanceolate, acute, 0.6 cm long, scantily pubescent; peduncles slender, 6–18 cm long, eglandular, silky-pubescent; inflorescence a loose 7–11-flowered raceme, 5–8 cm long; pedicels 5–8 mm long, pubescent and eglandular-like calyx; bracteoles linear, 1–2 mm long; calyx 6–8 mm long, divided nearly to base into triangular-ovate acute teeth, with subpatent silvery-sericeous hairs; corolla yellow, 2 cm long, about three times the length of calyx; standard 22 mm long, glabrous, the rounded limb 15 mm broad, emarginate, four times as long as claw; wings 20 mm long, the oblong limb enlarged in upper part, three times the length of claw; keel 18 mm long, the limb 13 mm long, dilated in middle part; ovary sessile, shaggy with long soft hairs; style pubescent below, glabrous in upper part; fruit unknown. May.

Bare slopes at altitudes of 1,200–1,500 m.– Centr. Asia: Pam.-Al. (Gazimailik Mountains: Iomut – the only report). Endemic. Described from the Gazimailik Range in the Tadzhik SSR. Type in Leningrad.

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Genus 807. **CHESNEYA** * LINDL. **

Lindl. in Endl. Gen. (1840) 1275.

Flowers large, red, yellowish violet, or yellow; calyx tubular, gibbous at base, with 5 unequal acute teeth, almost bilabiate; stamens diadelphous; ovary sessile, many-ovuled; style curved, pubescent in lower part; stigma capitate, papillary; pods sessile, with appressed or spreading hairs, linear, lanceolate, linear-oblong to obovoid, mostly compressed laterally, unilocular, the valves twisted in maturity; seeds irregularly reniform, more or less flattened, rugose or alveolate. Plants herbaceous, or woody only at base, mostly suberect or decumbent, acaulescent or short-stemmed, grayish with silky pubescence, eglandular; leaves imparipinnate, with 1–7 pairs of entire leaflets and with herbaceous stipules; peduncles axillary, elongated, 1–3-flowered.

A genus containing about 20 species distributed mostly in Near and Central Asia; a few species reach eastward into Mongolia and E. India.

1. Pod 0.9–1.3 (1.7) cm long, oblong or obovoid, not flattened; flowers 11–12 mm long; leaves to 2 cm long . . . . 2.
+ Pod 3–9.5 cm long, linear-lanceolate to linear, flattened laterally; flowers (15) 21–35 mm long; leaves 3–10 cm long . . . . 3.
2. Pod 12–13 (17) mm long and 4–5 mm broad, oblong; calyx 6–8 (10) mm long; leaflets cuneate-obovate . . . . 8. **C. ferganensis** Korsh.
+ Pod ca. 9 mm long and ca. 5 mm broad, obovoid; calyx ca. 5 mm long; leaflets cuneate-orbicular . . . . 9. **C. tribuloides** Nevski.
3. Leaflets 3-, less often 5-foliolate; terminal leaflet much larger than the others . . . . 4.
+ Leaflets 4–7 pairs; terminal leaflets not or scarcely larger than the others . . . . 5.
4. Terminal leaflet broadly ovate, broader than long; emarginate or truncate; stipules lanceolate, 4–5 mm long; plant silvery throughout with appressed pubescence; pod lanceolate, (4.5) 5.5–7.5 cm

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* Named for Chesney, leader of the 1835 expedition to the Tigris and Euphrates.

** Treatment by A. G. Borisova.

long, in the enlarged upper part 7–10 (17) mm broad, at first appressed-hairy, later glabrescent . . . . 2. **C. ternata** (Korsh.) M. Pop.

+ Terminal leaflet ovate, longer than broad, acutish; stipules ovate, large, ca. 1 cm long; plant clothed throughout with short soft spreading hairs; pod linear, 3–5.5 cm long, 5–6 cm broad in the scarcely enlarged upper part, white-pubescent with short spreading hairs . . . . 1. **C. linczevskyi** Boriss.

5. Stem to 20 (25) cm long, with scattered leaves and long internodes; flowers mostly in pairs; leaflets ovate-oblong to nearly quadrangular, large, 1–1.5 (2.5) cm long . . . . 7. **C. elegans** Fomin.

+ Stem absent or at most 4–5 (7) cm long, mostly with crowded leaves and short internodes; flowers mostly solitary, rarely in pairs (or in threes) and then corolla yellow; leaflets 3–7 (10) mm long or (10) 12–15 (20) mm long and then flowers yellow . . . . 6.

6. Leaflets (10) 12–15 (30) mm long, rounded-ovate; peduncles mostly 2-flowered; corolla yellow; one-year-old stems 4–5 cm long; plants (10) 12–20 cm high . . . . 6. **C. hissarica** Boriss.

+ Leaflets 3–7 (10) mm long, ovate-triangular, cuneate at base; peduncles 1-flowered; corolla red; plants acaulescent or nearly so, 5–7 (10) cm high . . . . 7.

7. Peduncles 1–1.5 cm long or shorter, greatly exceeded by leaves; pod narrowly linear, 6–9.5 cm long and 4–5 mm broad, with patent soft silky white hairs . . . . 5. **C. kopetdaghensis** Boriss.

+ Peduncles (2) 4–8 cm long, exceeding or shorter than leaves; pod lance-linear to linear, 4–6 cm long and 6–8 mm broad, with short appressed silky hairs . . . . 8.

8. Root stout, to 3 cm in diameter; crown short, woody, branched, forming a dense tuft; stipules crowded, densely hairy throughout, the upper linear in free part, the lower ovate; leaflets 3–5 (7) mm long; lower calyx teeth one quarter to one third as long as tube; limb of standard suborbicular, broader than long, distinctly auriculate at base . . . . 4. **C. crassipes** Boriss.

+ Root less stout; crown branched, elongated, mostly not forming a dense tuft; stipules remote, hairy only when young, ovate, the lower orbicular; leaflets 7–10 mm long; lower calyx-teeth one third to half as long as tube; limb of standard ovate, longer than broad, distinctly auriculate at base . . . . 3. **C. turkestanica** Franchet.

Section 1. **MACROCARPON** Boriss. — Pod 3–9.5 cm long, linear-lanceolate to linear, flattened laterally; flowers (15) 21–35 mm long; leaves 3–10 cm long.

Series 1. **Subacaules** Boriss. — Plants acaulescent or nearly so. Central Asian species.

1. **C. linczevskyi** Boriss. in Not. Syst. t. VII, f. 8 (1938) 181. — Ic.: l. c. f. 1, a, b.

Perennial, 5–8 cm high, covered throughout with short soft spreading hairs; one-year-old stems short; old shoots long, decumbent, covered with remnants of stipules; stipules large, ovate, ca. 1 cm long, the cauline united at base, coarsely toothed at apex; leaves 3–5 cm long, 3-foliolate, with petiole shorter than lamina; lateral leaflets ovate, (5) 10–15 mm long and (4) 10–12 mm broad, cuneate at base, obsoletely point-tipped from truncate apex; upper leaflets ovate, (10) 20–30 mm long, (8) 15–23 mm broad, broadly cuneate at base, acutish at apex; all leaflets densely covered on both sides with soft white hairs; peduncles 1-flowered, about equaling leaves; calyx 15–18 mm long, gibbous at base; teeth lanceolate, acuminate, of these three ca. 5 mm long, the other two united to above the middle; corolla unknown; staminal tube persistent in fruit, ca. 25 mm long; pod 3–5.5 cm long, linear, scarcely enlarged in upper part, 5–6 mm broad, acute at apex, white-puberulent in maturity; seeds reniform, ca. 5 mm long and 4 mm broad, pitted. Fr. May.

Red clay outcrops. — Centr. Asia: Pam.-Al. (S. Tadzhikistan, Parkhar District, E. slopes of Kara-tau Range below the Sardodakutal' Pass, S. slope, at an altitude of 800 m, on 21 May, 1936, No. 287, collected by I. A. Linchevskii and T. I. Maslennikova). Endemic. Described from the Kara-tau Range in S. Tadzhikistan. Type in Leningrad.

Note. Closely related to C. ternata, from which it differs in the shape of the terminal leaflets; the large ovate toothed stipules; the indument of the plant as a whole, the shape of the pod, and the large size and structure of the seed.

2. **C. ternata** (Korsh.) M. Pop. in Schedis ad HFAM fasc. IX, No. 260a et 260b (1927). — Kostyczewa ternata Korsh. in Mém. Ac. Pétersb., sér. VIII, IV, 4 (1896) 92; Taubert in Engl. und Prantl, Nat. Pflzfm. II, 166; Fedch. in A. H. P. XXIV (1906) 25; Fedtsch. O. et B. Consp. Fl. Turk. 2 (1909) 177. — K. trifoliata Lipsky in sched.; Freyn in Bull. Herb. Boiss. V (1904) 444. — Ic.: Korsh, l. c. tab. II, f. 2; A. Borissova in Not. Syst. t. VII, f. 8 (1938) fig. 1 c. — Exs.: Herb. Fl. As. Med., l. c.

Perennial, 5–7 cm high, with silvery appressed pubescence throughout; stem short; stipules lanceolate, entire, 4–5 mm long and 2–3 mm broad,
379 adnate at base to petiole; petiole equaling or longer than lamina; leaflets broadly ovate, 1–1.5 cm long and 1–1.8 cm broad, cuneate at base, obtuse at apex, sometimes obscurely point-tipped; terminal leaflet about one and a half times as long as the rest, broader than long, mostly emarginate or truncate; peduncles 1-flowered, shorter than leaves; calyx ca. 20 mm long, two-thirds the length of flower, covered with appressed silvery hairs; teeth lanceolate, acuminate, one-third to half as long as tube; corolla violet; standard ca. 30 mm long, appressed-hairy on the outside, the ovate-oblong limb with rectangular auricles at base, the filiform claw ca. 1 mm long; wings shorter than standard, 25–28 mm long, the oblong-elliptic limb two-thirds as long as the filiform claw; keel equaling wings, the obtuse limb tapering toward base, the filiform claw ca. 17 mm long; pod lanceolate, (4.5) 5.5–7.5 cm long, spotted, enlarged in upper part, 7–10 (17) mm long [sic, presumably broad] appressed-hairy, at length glabrescent, 8–12-seeded; seeds reniform, ca. 4–5 mm long and 3–4 mm broad, alveolate-pitted, light brown. Fl. April; fr. April–August.

Gravelly and clayey mountain slopes in the steppe belt, at altitudes of 1,000–1,800 m. — Centr. Asia: T. Sh. (W.), Pam. -Al. Endemic. Described from the Alai Range. Type in Leningrad.

3. **C. turkestanica** Franchet in Ann. Sc. Nat. sér. VI, XV (1883) 253. — C. acaulis auct., non Baker.

Perennial, 7–10 cm high, with a woody taproot and an elongated branched crown, grayish-pubescent with soft silky appressed hairs; stems very short, often obsolescent; stipules ovate, adnate to the middle to petiole, remote, hairy only when young, later scantily hairy; leaves 5–8 cm long; petioles 2–5 cm long; leaflets (4) 5–7 pairs, approximate to remote, almost alternate, petiolulate, obovate or cordate, 7–10 mm long, cuneate at base, mucronate from broadly emarginate apex; peduncles radical, 1-flowered, 4–7 cm long, mostly shorter than leaves; calyx ca. 1.8 cm long, covered with white and yellow appressed hairs; teeth lanceolate, acute, the lower one-third to half as long as tube; standard 3–3.5 cm long, densely sericeous outside, the ovate limb 2–2.5 cm long and 1.5 cm broad, gradually attenuate into petiole, obsoletely auriculate; wings ca. 2.8 cm long, the broad-elliptic limb as long as the filiform claw, with short obtuse auricles at base; keel ca. 2–3 cm long, the limb ca. 1 cm long, the claw filiform; pod linear-oblong, 4–6 cm long, acuminate, reddish-spotted, silky with short appressed hairs. F. May–July; fr. June–August.

Stony and gravelly mountain slopes, at altitudes of 1,400–2,000 m, in the
0 steppe and wood-and-shrub vegetation zone. — Centr. Asia: Pam. -Al. (Zeravshan, Gissar, Darvaz). Endemic. Described from Pam. -Al. ("inter Marguib et Varsaaut").

4. **C. crassipes** Boriss. in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, 3 (1936) 207. — Ic.: Fl. Tadzh. V (1937) tab. 62.

A dwarf, acaulescent perennial, 5–7 (10) cm high, with a woody taproot to 3 cm thick; crown branched, short, woody, forming a dense tuft; stems obsolescent, appressed-hairy; stipules crowded, the lower ovate in free part, the upper linear or sometimes filiform, all densely appressed-hairy; leaves 3–5 cm long, with petioles 1–1.5 (3) cm long; leaflets 5–7 pairs, triangular-orbicular or obovate, 3–7 mm long, mucronate from emarginate apex, densely appressed-hairy, especially beneath, cuneate at base; peduncles 1-flowered, weak, exceeding leaves, 2–8 cm long; flowers large, 2–2.5 cm long; calyx 1.5 cm long, covered with black as well as fewer white hairs; teeth triangular-lanceolate, one-fourth to one-third as long as tube; corolla red (in dry state); standard 2.7–2.9 cm long, the suborbicular limb 1.6 cm long and 1.8 cm broad, distinctly auriculate, densely appressed-hairy on the outside, abruptly contracted at base into a linear claw 11 mm long; wings ca. 2.5 cm long, the limb half as long as the filiform claw, with small obtuse auricles at base; keel ca. 2–2.3 cm long, the limb half as long as the filiform claw; pod linear, 4–6 cm long and 0.6–0.8 cm broad, densely silky with appressed white hairs; seeds reniform, compressed, 5 mm long and 3–5 mm broad, alveolate, ochraceous. Fl. May–June; fr. June–August.

Stony and gravelly slopes, taluses, rock crevices, among wormwood and wormwood-feathergrass communities, at altitudes of 1,400–2,000 m. — Centr. Asia: Pam. -Al. (E. Tadzhikistan: Bal'dzhvan, Darvaz, Peter the First Range, W. Pamirs). Endemic. Described from Darvaz (around the village of Tigavun). Type in Leningrad.

5. **C. kopetdaghensis** Boriss. sp. nova in Addenda X, p. 302. — Perennial, with a long woody taproot, almost acaulescent or with stem to 5—7 cm long, 5—10 (15) cm high, densely covered with short patent silvery hairs, more white-hairy when young; stipules herbaceous, ovate, pubescent, 3—4 mm long; leaves imparipinnate, 5—9 cm long, the densely patent-hairy petiole shorter than to as long as lamina; leaflets 4 or 5 (6) pairs, elliptic or obovate, densely silvery-sericeous, obtuse or retuse, muticuous, (3) 5—10 (12) mm long and (2) 3—7 mm broad; peduncles much shorter than leaves, 1—1.5 (2.5) cm long, 1-flowered; flowers large, obsoletely bracteolate;
381 calyx silky-pubescent, narrowly tubular, 11—13 (15) mm long, the unequal ovate-triangular teeth one-third to half as long as tube; corolla yellowish violet, (15) 21—26 mm long, twice the length of calyx; standard orbicular, pubescent outside, exceeding wings and keel, the claw nearly as long as limb; wings (13) 16—23 mm long, the ovate-elliptic obtuse limb (5) 9 mm long and (3) 5 mm broad, almost exauriculate, the claw filiform; keel (12) 20 mm long and 3—5 mm broad, the limb 6—7 mm long, curved dorsally at a right angle, the claw filiform; pod 6—9.5 cm long and 4—5 mm broad, narrowly linear, short-acuminate, covered with patent soft silky white hairs; seeds reniform, compressed, pitted and tuberculate-rugose, 5 mm long and 3 mm broad. Fl. April—May; fr. May—August. (Plate XXV, Figure 2).

Dry gravelly-clayey, gravelly and, stony slopes, and taluses. — Centr. Asia: Mtn. Turkm. (Kopet Dagh Range). Described from the Kopet Dagh Range. Type in Leningrad.

Note. Resembling C. astragalina Jaub. et Spach, from which it differs in silvery-gray pubescence, leaf shape, smaller flowers, size and shape of calyx-teeth, shape of flower parts, size of pod, seeds, and distribution area.

6. **C. hissarica** Boriss. in Fl. Tadshik. Appendix V (1937) 684. — Ic.: l. c. tab. 61.

Perennial, (10) 12—15 (20) cm high, with a woody often stout taproot, clothed with short appressed hairs; one-year-old stems 4—5 cm long; stipules ovate, 6—10 mm long and (2) 3—5 mm broad, acute, with two unequal teeth, herbaceous, scantily hairy; leaves 7—10 cm long, on petioles 2—5 cm long; leaflets 4 or 5 pairs, rounded-ovate, 1.2—3 cm long and (1) 1.2—1.5 (2) cm broad, deeply and broadly emarginate and sometimes mucronate, short-petioluled, nearly always opposite, covered with appressed white hairs, densely beneath, scantily so to almost glabrous above; peduncles 10 cm long, 2- (rarely 1- or 3-) flowered, about equaling the leaves; calyx half as long as corolla, covered with soft appressed white hairs; teeth triangular-lanceolate, acute, one-fourth to one-third as long as tube; corolla yellow; standard ca. 3—3.5 cm long, hairy outside, the ovate limb 2—2.5 cm long and 1.8 cm broad, almost exauriculate, gradually tapering to claw ca. 1 cm long; wings ca. 2.5 cm long, the oblong-elliptic limb two-thirds as long as claw, with obsolescent obtuse auricles at base; keel ca. 2.3 cm long, the obtuse limb dilated in upper part, half as long as the filiform claw; pod linear-lanceolate, 4—7 cm long, appressed-sericeous, with reddish spots; seeds reniform, compressed, ca. 5 mm long and 3 mm broad, pale green. Fl. May—June; fr. May—September.

382 Stony slopes in the wood-and-shrub vegetation zone, at altitudes of 1,600—2,100 m. — Centr. Asia: Pam.-Al. Endemic. Described from the Gissar Range. Type in Leningrad.

Series 2. **Caulescentes** Boriss. — Plants with developed stems and internodes.

*7. **C. elegans** Fomin in Monit. Jard. Bot. Tiflis I (1905—1906) 6; Grossg., Fl. Kavk. III (1930) 294.

Perennial with an almost woody taproot, woody at base, with flexuous stems 20(25) cm long, cinereous with short, appressed, somewhat tomentose indument; stipules short, obovate, 2—4-toothed; leaves 5—10 cm long, the petiole half as long as lamina; leaflets 5 or 6 pairs, 1—1.5 (2.5) cm long and 0.4—1 (2) cm broad, obovate-oblong, almost quadrangular, cuneate at base, mucronate from truncate or emarginate apex, appressed-pubescent; peduncles half as long as leaves, 1- or 2-flowered; pedicles shorter than calyx-tube; calyx appressed-lanose, with oblique limb, the unequal teeth acute; upper teeth half as long as calyx-tube and twice the length of lower teeth; corolla ca. 3 cm long, bright bluish violet (yellowish violet, according to Fomin); standard 29 mm long, the rounded-oval limb 20 mm long and 18 mm broad, with obsolescent rectangular auricles at base, the claw ca. 9 mm long; wings 26 mm long, the ovate limb ca. 13 mm long, 7 mm broad in the broader upper part, with a short obtuse auricle at base, the filiform claw ca. 13 mm long; keel ca. 21 mm long and 6 mm broad, the ovate obtuse limb ca. 9 mm long, curved at a right angle, the claw 12 mm long; pod 5—6 cm long and 5—7 mm broad, linear, straight, acuminate, slightly arachnoid-lanose; seeds reniform, 3 mm long and 2—3 mm broad, brown, almost smooth, alveolate on the back (according to Fomin).

Dry, clayey and stony soils. — At Soviet frontier — Arm.-Kurd. [former] Kars Region, Olty District, Olty and village of Kosor, Artvin District, vicinity of Ardanauch around village of Tsrnya). Endemic? Described from Olty. Type in Tbilisi.

Section 2. **MICROCARPON** Boriss. — Pods 0.9—1.3 (1.7) cm long, oblong or obovate, not compressed; flowers 11—12 cm long; leaves to 2 cm long.

8. **C. ferganensis** Korsh. in Mém. Ac. Petersb. sér. VIII, IV (1896) 90. — Calophaca ferganensis B. Fedtsch., Rast. Turk. (1915) 514. — Ic.: Korsh. l. c. tab. II, f. 1. — Exs.: Herb. Fl. As. Med. No. 259.

Perennial, with a stout woody taproot and a woody crown divided into a number of long slender weak creeping shoots 10—20 cm long, densely 3 covered throughout with soft subpatent white hairs; stipules herbaceous, free, scarcely adnate at base to petiole, triangular-ovate, long-acuminate, 2—3 mm long; leaves imparipinnate, 1—2 cm long, the petiole ca. 0.5 cm long; leaflets mostly 2 or 3 (rarely 4) pairs, cuneate-obovate, 7—9 mm long and 3—5 mm broad, rounded or truncate or emarginate at apex, sometimes obsoletely mucronulate, sessile, densely pubescent beneath; peduncles axillary, 1-flowered, shorter than leaves; flowers ca. 12 mm long, with obsolescent bracteoles; calyx gibbous at base, densely hairy, reddening, campanulate, 6—8 (10) mm long; teeth lance-subulate, unequal, about as long as tube; corolla reddish, twice as long as calyx; standard pubescent, short-clawed, ca. 2 mm long, the orbicular limb 9—10 (13) mm long and ca. 9 (13) mm broad, slightly retuse at apex, yellowish at base within; wings ca. 10 mm long, oblong, with a short curved claw ca. 2 mm long, the limb oblong, obliquely truncate, 4—5 mm broad, obtusely auriculate, keel scarcely shorter than wings, the limb curved at a right angle, 5 mm long and ca. 4–5 mm broad, the claw ca. 3 mm long; staminate column obliquely truncate; ovary sessile, lanceolate, long-hairy, ca. 4 mm long; style ca. 8 mm long, pubescent in lower part, incurved at an angle from the middle; pod sessile, oblong, indurated, 12–13 (17) mm long and 4–5 mm broad, densely soft-hairy, 2- or 3-seeded; seeds subreniform, compressed, brown, irregularly reticulate-alveolate, ca. 3 mm long. Fl. May–July; fr. August. (Plate XXV, Figure 3).

Stony slopes and dry, stony, riverside terraces, at altitudes of 1,700–2,000 m. – Centr. Asia: T. Sh. (Lake Issyk-kul', Sai-Tamga, in Shsamyr River valley, along Uyunkur-su River in the Fergana Range). Endemic. Described from the Fergana Range. Type in Leningrad.

Note. Specimens from Lake Issyk-kul' are more densely hairy and have larger flowers.

Economic importance. An ornamental plant.

9. **C. tribuloides** Nevski in Acta Inst. Bot. Ac. Sc. USSR, IV, f. 1. (1937) 251. – Calophaca depressa M. Pop. in Tr. Turk. nauchn. obsch. I (1923) 18, pp. non Oliv. – Ic.: l. c. f. 2.

Perennial, with a stout woody taproot, tufted from a woody crown, densely covered throughout with soft spreading white hairs; stems (3) 5–10 cm long, weak, decumbent to suberect; stipules herbaceous, ca. 1 mm long, free, rounded-ovate, subacute, sometimes with a few teeth on the margin; leaves imparipinnate, 0.8–1 (1.2) cm long, with petiole 2–3 mm long; leaflets (2) 3–4 pairs, cuneate-orbicular, truncate or rounded at apex, densely patent-384 villous, especially beneath, 1.5–2.5 mm long and as broad; peduncles ca. 4 mm long, axillary, 1-flowered, exceeded by leaves; calyx broadly campanulate, ca. 5 mm long, reddish-tinged, patent-hairy, the unequal acute teeth shorter than or as long as tube; corolla ca. 11–12 mm long, reddish yellow; standard appressed-hairy outside, the rounded-rhombic limb slightly dilated toward base, 11–12 mm long and 8 mm broad, scarcely emarginate, yellow within, violet-nerved about the middle, gradually tapering into a broad claw ca. 1 mm long; wings yellowish, ca. 11 mm long, the oblong limb concave dorsally, obliquely truncate, the filiform claw ca. 1 mm long, the auricle short and obtuse; keel incurved at a right angle dorsally, obliquely truncate ventrally, 7 mm long and ca. 4 mm broad, the claw ca. 2 mm long; ovary sessile, ovoid, pubescent, ca. 2 mm long; style glabrous, curved at summit at a right angle; pod sessile, indurated, not compressed, obovoid, 9 mm long and ca. 5 mm broad, densely pubescent with soft spreading hairs, 2- or 3-seeded; seeds ca. 3 mm long and broad, irregularly reniform, brown, reticulate-alveolate. Fl. June–July; fr. July–September.

Gravelly mountain slopes and mottled low-mountain relief. – Centr. Asia: Pam.-Al. (in the Kugitang Range near Kugitang village, and near Kelif on the Amu Darya River). Described from the Kugitang Range. Type in Leningrad.

Note. Related to C. ferganensis Korsh., from which it differs in shape of leaflets, shape of flower parts, and size of pod. From C. depressa (Oliv.) M. Pop., to which it is closely related, it differs in the smaller number of leaflet pairs (mostly 3 pairs, as against 4 pairs in C. depressa), slightly different leaflet shape, and a different distribution area (C. depressa occurs in Kashmir).

Genus 808. **GUELDENSTAEDTIA** * FISCH.**

Fisch. in Mém. Soc. Nat. Mosc. VI (1823) 170.

Calyx campanulate, with 2 bracteoles at base, the teeth unequal, the upper ones broader; petals free; wings about equaling standard; keel one-third to half as long as standard and wings; stamens diadelphous, shorter than keel; ovary sessile; style short, glabrous, incurved at summit; stigma obtuse, rounded; pod linear, almost cylindric, 1-celled, many-seeded, with divergent, spirally twisted valves; seeds small, reniform, pitted. Acualescent or almost acaulescent perennials, usually with a stout vertical taproot; leaves
5 simple, with a pair or rudimentary leaflets or else composed of 4–9 leaflet pairs; inflorescence a 2–6-flowered umbel; flowers red, violet, or rarely yellow.

A genus containing 16 species distributed mainly in Middle Asia. Only two species occur in the USSR and these are not to be found to the west of Altai.

1. Leaves simple, with orbicular or rounded-reniform blade 1–3.5 cm long and 1.5–4.5 cm broad, sometimes 2- or 3-lobed, rarely 3-foliolate with 2 rudimentary lateral leaflets .... 1. **G. monophylla** Fisch.
+ Leaves imparipinnate; leaflets 5–9 pairs, oval, oblong, or lanceolate .... 2. **G. pauciflora** Fisch.

1. G. monophylla Fisch. in Mém. Soc. Nat. Mosc. VI (1823) 171; DC. Prodr. II, 307; Ldb. Fl. Alt. III, 260; Ldb. Fl. Ross. I, 564; Kryl., Fl. Zap. Sib. VII, 1627. – Ic.: Fisch. l. c. tab. 19.

Acaulescent, stoloniferous perennial, 5–15 cm high, with a strong taproot to 2 cm in diameter; stolons densely covered in upper part with stipules and remnants of old petioles; stipules lanceolate, ca. 3–5 mm long, appressed-hairy, ciliate, connate for much of their length; leaves on long appressed-hairy petioles 2–6 cm long, simple or very rarely 3-foliolate with minute obsolescent lateral leaflets; leaf-blade rounded-reniform or orbicular, broad or sometimes slightly notched at base, obtuse to short-pointed at apex; sometimes leaves 2- or 3-lobed, appressed-sericeous, more profusely beneath, scantily above, 1–3.5 cm long and 1.5–4.5 cm broad, the minute petiolule distinctly articulating with petiole; peduncles numerous, slender, appressed-sericeous, erect to spreading as are the leaves, 3–13 cm long, slightly exceeding leaves; inflorescence an umbel with 2–6 spreading flowers, on pedicels 1–2 mm long or subsessile; bracts filiform, 2–5 mm long; bracteoles filiform, shorter than calyx-tube; calyx broadly campanulate, sericeous, 5–6 mm long, the unequal lanceolate teeth two-thirds as long as tube; corolla violet; standard broadly obovate, entire or slightly emarginate at apex, 12–14 mm long, the claw broad and short; wings 10–12 mm long, about equaling standard, the oblong obtuse limb dilated in upper part, the claw 1–1.5 mm long; keel ca. 4 mm long, whitish, the limb incurved at an angle, about as long as the filiform claw; staminal tube shorter than keel; ovary oblong, hairy; style curved, glabrous in upper part, ca. 1 mm long, with thickened stigma; pod 1-celled, linear-cylindric, ca. 2.5 cm long and 3.5–5 mm

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* Named for I. A. Gueldenstaedt, traveller and botanist (1745–1781).

** Treatment by A. G. Borisova.

386 broad, appressed-pubescent, sparsely so in maturity, 6—9-seeded; seeds 3 mm in diameter, rounded-reniform, olivaceous, pitted, on funicle ca. 1 mm long. Fl. May—July; fr. June-August. (Plate XXV, Figure 4).

Rocks, dry stony and gravelly slopes. — W. Siberia: Alt. **Gen. distr.:** Mong. (N. and NE). Described from Altai (Korgon). Type in Leningrad.

2. **G. pauciflora** (Pall.) Fisch. in Mém. Soc. Nat. Mosc. VI (1823) 173; DC. Prodr. II, 307; Ldb. Fl. Ross. I, 564. — Astragalus pauciflorus Pall. Astrag. 81 (1801) No. 88; Willd. Sp. pl. III, 1319. — A. biflorus Pall. Reise III (1773) 206. — A. vernus Georgi It. I (1780) 226. — A. brevicarinatus DC. Astrag. 193 No. 148. — Ic.: Pall. l. c. tab. 66, f. B.; DC. Astrag. T. 49.

An almost acaulescent, stoloniferous perennial, 4—20 cm high; taproot vertical, thickened, fleshy; stolons rather long, with remnants of old stipules; stipules ovate-triangular, rarely lanceolate, appressed-hairy, connate for much of their length; leaves imparipinnate, 2—20 cm long, the hairy petiole two-thirds as long as lamina; leaflets 5—9 pairs, 0.5—2.5 cm long and 1.5—7 mm broad broad, oblong to lanceolate, obtusish to acute, mucronulate, hairy on both sides or sometimes glabrous above; peduncles 2—10 per plant, slender, about equaling the leaves, white-hairy; inflorescence umbelliform, 2—4-flowered; flowers sessile or borne on pedicels 0.5—1 mm long; bracts filiform, 2—3 mm long, hairy; bracteoles filiform, hairy, about equaling the calyx-tube 5—7 mm long, broadly campanulate, sericeous, the unequal lanceolate teeth two-thirds as long as tube; corolla purple; standard ca. 11—12 mm long, the rounded-ovate entire limb tapering to a short claw; wings 8—9 mm long, the oblong obtuse limb somewhat dilated at apex, the claw ca. 1.5 mm long; keel ca. 5 mm long, the oval limb about as long as the filiform claw; staminal tube slightly shorter than keel; ovary oblong, hairy; style curved at summit, less than 1 mm long, with thickened stigma; pod 1-celled, linear-cylindric, 1.5—2 cm long and 3—4 mm broad, softly patent-pubescent, sparsely so in maturity; seeds 1.5 mm in diameter, rounded rounded-reniform, shining, shallowly pitted, on funicles ca. 1.5 mm long. Fl. May; fr. June—July.

Sandy soils and steppe fallows and dry stony slopes. — W. Siberia: Alt. (Katun Valley). E. Siberia: Ang.-Say., Dau.; Far East: Uss. **Gen. distr.:** Korea, Manchuria. Described from the vicinity of Irkutsk and from Dauria. Type in Leningrad.

Note. Not previously reported for Altai.

DIAGNOSES PLANTARUM NOVARUM IN TOMO XI FLORAE URSS COMMEMORATARUM

(DIAGNOSES OF NEW SPECIES MENTIONED IN VOLUME XI)

Augusto 1941

GENISTA L.

1. **G. compacta** Schischk. sp. nova (sect. *Spartioides* Spach in Ann Sc. nat. 3 ser., III (1845) 113).

Fruticulus humilis, 8—25 cm altus, valde ramosus, ramulis brevibus adscendentibus pilis densis mollibus patentibus vestitis; folia lanceolata vel oblonga, 8—11 mm longa et 1—2 mm lata, acuta, suprema ovata obtusiuscula, utroque latere villosa. Flores flavidi, pedicellis brevibus, racemum brevem compactum, late ovatum, 2—3 cm longum formantes; calyx pubescens, 5 mm longus, usque ad dimidium dissectus, dentes duo superiores lato-ovati, tres inferiores anguste lanceolati; vexillum late ovatum, 12 mm longum et 9 mm latum, apice retusum, cum carina extus sericeo-villosum, alae vix, carina ad 3 mm vexillo breviores, ovarium dense pubescens, fructus ignoti.

Habitat: in rupibus.

Typus: Caucasus occidentali-septentrionalis, distr. Maikop, in monte Zhitnaja, leg. V. P. Maleev; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Affinis. *G. albidae* Willd sed foliis longioribus (8—11 nec 4—8 mm longis) racemo denso statim dignoscitur.

2. **G. angustifolia** Schischk. sp. nova (sect. *Spartioides* Spach in Ann. Sc. nat. 3 ser., III (1845) 117).

Fruticulus humilis, 5—40 cm altus, ramis adscendentibus, glabris, solum juvenalibus vix pubescentibus; folia lanceolata vel anguste lanceolata, raro anguste ovata, acuta vel obtusa, basi attenuata, sessilia, 9—11 mm longa ac 1—2.5 mm lata, marginibus rite revoluta, subtus sericeo appresse villosa, supra glabra vel vix pubescentia. Flores flavi racemos laxos apice ramorum formantes, pedicelli sat longi (3—5 (10) mm longi), pubescentes; calyx 5.5 mm longus, breviter pubescens, usque ad $^1/_3$—$^1/_2$ dissectus dentibus acutis, superioribus anguste lanceolatis; vexillum late ovatum 14—15 mm longum et 8—9 mm latum, basi cuneato angustatum, extus pubescens, alae vexillo vix breviores, carina eum subaequans, extus pubescens; legumina nondum matura dense villosa, oblongo-linearia, 20 mm longa et 4 mm lata.

Habitat: in abruptis calcareis.

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* [This appendix has been reproduced photographically from the Russian original.]

Typus: Caucasus occidentali-septentrionalis, distr. Maikop, in monte Schidecho, in decliviis ad ripam fl. Daisu, fl. et fr. 30 VI 1936, V. P. Maleev; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Nostra species appropinquat ad *G. scythicam* Pacz., sed pedicellis longioribus (4—10 mm longis nec 1—3 mm), calycibus majoribus (5.5 mm longis nec 4—4.5 mm), vexillo majore (14—15 mm longo nec 12—13 mm).

3. **G. artwinensis** Schischk. sp. nova (sect. *Genistoides* Spach in Ann. Sc. nat. 3 ser. III (1845) 124).

Radix crassiuscula, 5—7 mm in diametro, caules numerosos in parte inferiore lignescentes et adscendentes emittens, caules 15—25 cm alti, ramosi ramulis brevibus, glaucescentes, pilis raris rigidis sursum oblique vergentibus; folia anguste lanceolata, 0.8—2.5 cm longa et 1—3.5 mm lata, acuta, marginibus ciliata, ciliis sursum oblique vergentibus. Inflorescentia racemosa, 5—10 cm longa, in parte inferiore floribus laxe, in parte superiore densiuscule dispositis, pedicellis 1—2 mm longis, glabris; calyx 5 mm longus usque ad $^2/_3$ sectus, dentibus tribus angustis et duobus latioribus; corolla flava, vexillum late-ovatum, 12 mm longum et 8 mm latum, apice rotundatum ungue brevi; alae carinaque vexillo vix breviores; ovarium glaberrimum; legumen glabrum, lineari-oblongum, 3 cm longum et 4 mm latum.

Habitat: in rupestribus clivis aridis et detriticis, saepe inter frutices.

Typus: Turcia, distr. Artwin; in rupestribus et clivis aridis supra pag. Lomaschen, fl. 21 IV 1908, leg. G. Woronow.

Affinitas: *G. artvinensis* valde affinis *G. Lydiae* Boiss. et *G. ponticae* Spach sed ab utraque calycibus profundius (ad $^2/_3$) partitis, dentibus calycinis glaberrimis (nec hirsutis) et racemis multifloris (nec paucifloris). bene differt.

4. **G. suanica** Schischk. ex Grossh. Fl. Kavk. II (1930) 252 (rossice).

Basi lignescens, caulibus numerosis ascendentibus, simplicibus vel superne ramosis, vix pubescentibus, angularibus, 20—40 cm altis; folia lanceolato-linearia, 1—2.5 cm longa et 1—3 mm lata, acuta, basi angustata, sessilia, paullulum pubescentia vel subglabra, marginibus et nervo mediano molliter ciliata. Inflorescentia racemosa, laxa, 7 cm longa; flores lutei, pedicellis brevibus (3 mm longis) vix pubescentibus, basi vel ad medium bracteis lanceolato-linearibus instructis; calyx leviter pubescens, 6—7 mm longus, quinquedentatus, dentibus inferioribus duobus triangularibus, basi 1.5—2 mm latis, superioribus linearibus, 0.75 mm latis; vexillum late ovoideum, 12—14 mm longum et 8—9 mm latum, apice integrum, rotundatum, basi indinstincte cordatum in unguem brevem (2 mm longum) abrupte attenuatum; carina et alae vexillo vix breviores, unguibus longioribus (ad 4 mm longis); ovarium glabrum; legumen (nondum maturum) lineari-oblongum, glaberrimum.

Typus: Georgia, Suania; ad glaciem Isturga (Umba), in rupestribus alpinis, VII 1911, leg. A. Schelkovnikov; in herbario Musei Georgici (Tbilisi).

Affinis est *G. transcaucasicae* Schischk., sed floribus majoribus, vexillo usque ad 14 mm longo (nec 11—12), caulibus robustioribus.

MEDICAGO L.

5. **M. borealis** Grossh. sp. nova (Subgen. *Falcago*, series *Brachycarpae*).

Perennis. Caules numerosi, adscendentes, rarius erecti, 40—60 (80) cm alti, cum foliis glabris. Stipulae ad $^1/_3$—$^1/_2$ connatae, parte libera semihastatae, margine dentatae. Foliola 10—25 mm longa, obovata vel oblongo-obovata, apice dentata. Scapus folio longior. Inflorescentia laxiflora, 15—25-flora. Pedunculi tenues, calyce breviores. Calyx tubulosus, dentibus subulatis acutis tubo longioribus. Corolla flava. Legumen pendulum, semilunare, glabrum, paucispermum.

Habitat: in parte boreali URSS.

Typus: in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

TRIFOLIUM L.

6. **T. fontanum** Bobr. sp. nova (Subsect. *Leimonophyllum*, series *Pratenses*). — *T. pratense* var. *pilosum* Grossh. Fl. Kavk. II (1930) 285.

Ex affinitate *T. pratensis*. Caules superne et sub nodis pilis albis appressis tecti; foliola foliorum radicalium obovata, superiorum ovata vel lanceolata, utrinque margine ac subtus praesertim pilosa. Capitula majora flores intense violaceo-purpurei, vexillum latum auriculis majoribus, lamina unguiculo subaequali, tubulos corollae latior.

Habitat: in subalpinis jugi Caucasi Principalis in pratulis humidis ac in paludibus fontinalibus, in aqua frequens, 1500—2500 m alt. s. m.

Typus: Caucasus, Balkaria, Sukan, 19 VII 1931, leg. E. et N. Busch; n Herb. Inst. Bot. Ac. Sc. URSS conservatur.

7. **T. seravschanicum** Ovcz. sp. nova (Subsect. *Leimonophyllum*, Series *Pratenses*); Acta Inst. Bot. Ac. Sc. ser. 1, 4 (1937) 251, nomen. — *T. pratense* var. *pilosius* Ovcz., in sched.

Ex affinitate *T. pratensis*. Planta paucifolia propter pubescentiam densam cinerascens, caules praesertim sub nodis ac stipulae foliaque copiose pilosi; stipulae ovatae attenuato-acuminatae multivenosae, foliola lanceolata minora, capitula ovata laxa vix minora.

Habitat: Asia Media, in pratulis humidis jugi Seravschanici in ditione lacum Marguzar et in vallibus fluviarum Iskander-darja, Schink, Pasrud, 1500—2000 m s. m.

Typus: Jugum Seravschanicum, in valle flum. Pasrud, prope pag. Marguzar, 8 VIII 1932, leg. P. Ovczínnikov et A. Slobodov; in Herb. Inst. Bot. Ac. Sc. URSS.

8. **T. apertum** Bobr. sp. nova (Sect. *Hiantia*, Series *Apertae*). — *T. panormitanum* auct. Fl. Ross., non Presl. — *T. squarrosum* Grossh. Fl. Kavk. II (1930) 282, non L. nec M. B.

Annuum, caule erecto, vulgo inferne ramoso, praesertim superne appresse piloso; stipulae elongatae partis liberis sublinearibus acuminatis, marginibus patente pilosis, folia inferiora longius petiolata marcescentia; petiola appresse pilosa, foliola breviter petiolulata, 1.5—4 cm long., 0.5—1.5 cm lat., tenuia utrinque sparse appresse pilosa, parte superiore minute denticulata. Pedunculi appresse pilosi post anthesin elongata; capitula juvenilia anguste conica, tardius ovata et subcylindrica, 2—3.5 cm longa, ca. 1.5 cm lata, calyx 5—7 mm longus, tubo decemvenuli sparse piloso, venulis valde conspicuis; fauce calycis fructiferi aperta annulo piloso praedita, non callosa, dentes quatuor tubo calycino breviores, infimus (quintus) subduplo longior tubum superans, ultimus interdum basi trivenulis; dentes angustiores subulati non aculeati, in fructificatione subpatentes. Corolla lutea, interdum vix rosea, petalis basi connatis, vexillo spathuliformi, 14—15 mm long., petala alia multo superante; alae lanceolatae incurvatae, acuminatae; legumen obovoideum, membranaceum, superne subcoriaceum, monospermum. Fl. VI, fr. VII.

Habitat: in fruticetis, ad margines silvarum et in pratulis promontorium Ciscaucasiae occidentalis.

Typus: Caucasus borealis, prope urbem Majkop, 1 VII 1914, leg. N. L. Pastuchov; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Affinitas: Planta spontanea *T. alexandrino* L. affinis; differt calyce minus piloso tubi angustiori, venulis validioribus, dentibus angustioribus non aculeatis, univenulis in fructificatione subpatentibus; floribus majoribus, alis lanceolato-incurvatis acuminatis.

ANTHYLLIS L.

9. **A. taurica** Juz. spec. nova.

Planta biennis vel perennis; caules 2—10 in numero, e basi arcuato-ascendenti erecti, 15—30 (40) cm longi, plus minusve tenues et graciles, stricti vel paullo flexuosi, simplices vel ramis paucis erecto-patentibus gracilibus aphyllis in parte plantae superiore sitis instructi; tota longitudine pilis sat densis breviusculis perappressis vestiti, pallidi; folia radicalia numerosa, raro simplicia, foliolis lateralibus plerumque (1) 2—4 jugis, foliolo terminali lateralibus majore sed relative haud magno elliptico; folia caulina (2) 3—4 in numero, per caulem aequaliter disposita, foliolis lateralibus (3) 4—6 jugis lanceolatis vel lineari-lanceolatis interdum fere linearibus, foliolo terminali anguste vel lineari-lanceolato lateralibus submajore; foliola omnia supra glabra, subtus pilis laxe accumbentibus vel plerumque subpatentibus sat longis, margine pilis erecto-patentibus vel subpatulis tecta. Florum capitula 1—3 ad apicem caulium, sat remota, pedunculo generali longiusculo, 2—3 cm in diametro, potius pauciflora et laxiuscula; folia floralia calycem aequantia vixve longiora, rarius paullo breviora usque ad mediam partem vel paullo ultra incisa, lobis plerumque acutis; sicut folia caulina vestita; calyx 6—9 mm longus, 2.5—4.5 mm latus, pilis longis patentibus dense vestítus, pallidus (i. e. dentibus non coloratis); corolla pallide lutea, carina apice rubescenti.

Habitat: in Tauria.

Typus: in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Affinitas: Revocat *A. arenariam* (Rupr.) Juz., sed ab ea imprimis calycibus pilis longioribus subpatentibus tectis distincta. Ab *A. polyphylla* Kit. bene differt gracilitate, caulibus appresse pilosis etc.

10. × *A. polyphylloides* Juz. hybr. nova (*A. arenaria* Juz. × *A. polyphylla* Kit.). — Planta quoad habitum, florum et foliorum floralium dimensiones et calycum pubescentiam *A. arenariae* Juz. plerumque simillima, sed ab ea caulibus inferne patulo-pilosis diversa.

Habitat: in regione Leninopolitana necnon in Esthonia.

Typus: e vicinitate opp. Luga in Herb. Inst. Ac. Sc. URSS conservatur.

11. **A. colorata** Juz. spec. (vel hybr.) nova.

Planta inter *A. Linnaei* Sag. et *A. polyphyllam* Kit. media, caule saepe prostrato inferne saepius pilis patentibus vestito, capitulís numerosis, calycibus in parte superiore rubescentibus.

Habitat: in arenis maritimis et calcareis Esthoniae.

Typus: in vicinitate opp. Narva a cl. Meinshausen lectus; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

12. **A. lachnophora** Juz. spec. nova.

Planta biennis vel perennis; caules (1) 2—5 in numero, basi plerumque arcuato-ascendentes vel prostrati, 10—25 cm longi, sat robusti, plerumque curvati, simplices vel plerumque in $^3/_4$ vel $^1/_2$ superioribus ramosi, ramis elongatis sub angulo peracuto orientibus; tota longítudine pilis densis breviusculis appressis argenteis incurvatis tecti, rarius in parte inferiore patulo pilosi, plerumque virescentes; folia radícalia plerumque numerosa, in rosulam sat densam aggregata, foliolis lateralibus 1—3 jugis parvis ovatis, breve petiolulatis, foliolo terminali amplo ellíptico vel oblongo-elliptico utrinque rotundato apice minute acuminato; foliola omnia supra pilis sat densis vel haud raro sparsis vel solitariis sat longis et tenuíbus accumbentibus vel subpatentibus arachnoideis, subtus pilis accumbentibus sat densis vestita; petioli et rhachides foliorum radicalium pílis accumbentibus vel erecto patentibus dense tecti; folia caulina 2—4 in numero, per caulem plus minusve aequaliter disposita, foliolis lateralibus (1) 2—5-jugis anguste ovatis vel oblongo-lanceolatis utrinque angustatis apice plerumque acutatis, foliolo terminali lateralibus conformi, sicut foliola foliorum radicalium pubescentibus vel supra saepe densius araneoso-pilosis. Florum capitula 2—3 cm longe pedunculata, capitulo terminali e capitulis 2 approximatis composito, pedunculo capituli apicalis bene conspicuo; capitula 2—3 cm in diametro, florum numero mediocri; folia floralia calycem longitudine non superantia vixve superantia, ad $^1/_3$—$^3/_4$ longitudinis incisa, nervis haud prominentibus, lobis plerumque valde acutis, pilis densis tenuibus accumbentibus pilosa; calyx 9—12 mm longus, 3—4 mm latus, pilis densis tenuibus laxe accumbentibus vestitus, in parte superiore plerumque non coloratus; corolla lutea, sicca brunnescens.

Habitat: in declivibus apricis montium, in schistosis et in pratis subalpinis Caucasi.

Typus: e vicinitate opp. Tbilisi in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas: Differt ab *A. Boissieri* Sag. caulibus saepius appresse pilosis, foliolis terminalibus foliorum radicalium latioribus, foliolis lateralibus foliorum caulinorum saepe numerosioribus, corolla lutea.

COLUTEA L.

13. **C. acutifolia** Shap. sp. nova.

Folia 6 cm longa, 4—5-juga. Foliola ovalia vel oblonga, acuta, mucronulata, 5—7 × 14—15 mm, subtus sparse pilosa, supra nuda. Racemi 3—5-flori, 5—5.5 cm longi. Flores 12—13 mm longi, purpurei. Calyx companulatus, 5 mm longus, rictus calycis 4—5 mm, dentes subulati, tubo subaequilongi, sparse nigro-pilosi. Alae carina duplo breviores, planae, sub angulo 130° incurvae. Carina apicem rotundatum sine rostra. Ovarium nudum. Legumen nudum, circa 5 cm longum, 2 cm latum, stipitatum, in stipite calyce duplo longiore (8—9 mm longo), sutura ventralis minus incurvata quam dorsalis gratia cujus apex leguminis vulgo sursum inflexus.

Habitat: in declivibus saxosis partis occidentalis Caucasi Magni.

Typus: ad ripam fluminis Psezuape inferioris, Lipsky 21 VI 1895; in Herb. Inst. Bot. Ac. Sc. URSS.

Affinitas: A *C. abyssinica* Kunth et Bouché differt foliolis majoribus acutis, stipite leguminis breviore, duplo calycem superante.

14. **C. Jarmolenkoi** Shap. sp. nova.

Folia 7—8 cm longa, 3 (4)-juga. Foliola orbiculata, apice truncata vel retusa, magniuscula, 10—20 × 15—25 mm nuda, subglabra. Racemi 4-flori, 6—7 cm longi. Flores 17 mm longi, lutei. Calyx tubulate-campanulatus, 7 mm longus, rictus calycis 6 mm, dentes calycis longi (tubae duplo breviores), acuti. Alae carinae breviores vel aequantes, planae, sub angulo 130° incurvae. Curvatio rotundata. Carina truncata rostro vix conspicua. Ovarium nudum. Legumen subsessilum, nudum.

Habitat: in declivibus saxosis et vallibus fluviorum Asiae mediae.

Typus: ad trajectum Tschekmak, distr. Osch, reg. Ferganensis, O. Knorring, 23 VI 1913 n° 553; in Herb. Inst. Bot. Ac. Sc. URSS.

Affinitas: A *C. persica* Boiss. differt alis planis carina brevioribus.

15. **C. canescens** Shap. sp. nova. — *C. persica* Boriss. in Fl. Tadzhik. V (1937) 219 (non Boiss.), pro min. parte.

Frutex 2-metralis. Folia 8—9 cm longa, 4-juga. Foliola orbiculata, apice truncata vel retusa, basi cuneata, 7—9 × 9—12 mm, subtus dense albo-pilosa, supra appresse pilosa. Racemi 3—4-flori, ad 9 cm longi. Flores 17—18 mm longi, lutei. Pedunculus 7—10 mm longus dense pubescens. Calyx late-tubulatus, 8 mm longus, rictus calycis 7 mm, dentes calycis acuti, longi, tubo duplo breviores. Alae carina longiores planae, sub angulo 90° incurvae. Carina truncata, rostro vix conspicuo. Ovarium dense pilosum. Legumen 5 cm longum, 17 mm latum, stipitatum, in stipite calyce 2—2$^1/_2$-plo longior, basi attenuata, sparse pilosa; apex rectum attenuatum.

Habitat: in declivibus saxosis in montibus Pamiro-Alaj.

Typus: inter Ali Galaban et Pumbatschi, Newessky, 20 VIII 1878; in Herb. Inst. Bot. Ac. Sc. URSS.

Affinitas: A *C. Paulsenii* Freyn et Sint. foliolis subtus pilis brevibus appressis dense tectis differt.

16. **C. hybrida** Shap. sp. nova. — *C. persica* Boriss. in Fl. Tadzhik. V (1937) 219 (non Boiss.), pro min. parte.

Folia 3—4 cm longa, 2—3-juga. Foliola orbiculata vel late-obovata, apice truncata vel retusa basi cuneata, 4—8 × 5—10 mm, subtus breve adpresse-pilosa, supra nuda rugulosa. Racemi 2—3-flori, 4—6 cm longi. Flores 20 mm longi, lutei; calyx campanulatus, 6—7 mm longus, rictus calycis 6—7 mm, dentes calycis sat longi tubi duplo vel subtriplo breviores. Alae carina longiores, planae, sub angulo 100—110° incurvae. Carina truncata vel etiam obtusa, sine rostro. Vexillum ad basin rubescens, supra unguem maculis duobus lutescentibus instructum. Ovarium dense pilosum. Legumen circa 6 cm longum, 25 mm latum, stipitatum, stipite calyce duplo longiore, basi abrupte angustata.

Habitat: in declivibus saxosis in montibus Pamiro-Alaj.

Typus: prope Gusharv, jug. Hissar, Zaprjagaew, 15 V 1933, n° 242; in Herb. Inst. Bot. Ac. Sc. URSS.

Affinitas: A *C. Paulsenii* Freyn et Sint. differt floribus majoribus, ca. 20 mm long., ac carina truncata, non rostrata.

CARAGANA L.

17. **C. ussuriensis** (Rgl.) Pojark. sp. nova.

Frutex humilis, ramulis erectis, plus minusve costatis, annotinis glabris, nitidis, fuscis, vetustioribus cinereo-fuscis; stipulae anguste deltoideae, longe acuminatae, induratae, aculeatae; petioli 2—15 mm longi, caduci vel indurati persistentes, pungentes; folia bijuga nunc pinnata (pro more ramis sterilibus ramulisque axillaribus extremis), nunc subdigitata (in ramulorum axillarium partibus inferioribus), foliola adulta firma, subcoriacea, supra atroviridia, lucida, subtus pallidiora, nervis tenuibus prominentibus, utrinque glabra, elongata (2.5—4:1) obovato-cuneata, apice obtusa, rarius subacuta vel emarginata, apiculata, petiolulis 0.5—1 mm longis; pedunculi solitarii, rarissime gemini, uniflori, circa 2 cm longi, ad medium articulati. Calyx late tubulosus, 6—9 mm longus et 5 mm latus, basi gibbosus, dentibus late deltoideis, subito acuminatis; corolla 23—25 mm longa, lutea, marcescendo rubescensque, vexillo anguste obovato, apice emarginato, alis oblongis obtusis, cum ungue lamina duplo breviore et auricula brevi acutiuscula, atque carina acutiuscula, legumen ad latera compressum, acuminatum, 33—35 mm longum.

Habitat: in rupibus, in pratulis silvaticis et ad marginem viae regionis Ussuriensis.

Typus: regione Ussuriensi, in montibus Sumur ad fluv. Ussuri, anno. 1859, P. K. Maak (steril.).

Affinitas: differt a *C. chamlagu* Lam. floribus minoribus, calycis forma, foliolis multo angustioribus elongato-obovatis.

18. **C. scythica** (Kom.) Pojark. sp. nova.

Frutes humilis dense frondosus, ramulis brevibus, tenuissimis, 0.5—1 mm in diam., pubescentibus, fuscis, ramis vetustioribus 1—2 mm diam., costatis, fusco-griseis, lineis longitudinalibus suberosis vix evolutis ornatis, vel nullis; stipulae 0.5—1.2 mm longae ramis sterilis non raro in spinas tenues mutatis; petioli omnes abbreviati ramorum sterilium 2—7 mm longi, tenuissimi breve apiculati, persistentes, indurati, ramorum axillarium autem fere nulli, 0.3—0.75 mm longi, caduci; folia bijuga, foliolis digitatim fasciculatis, anguste obovato-cuneatis, vel oblanceolatis, apice acutiusculis vel rotundatis, apiculatis, utrinque vel solum superiore in pagina pubescentibus, 2—9 mm ongis, 0.3—1.8 mm latis; pedunculi solitarii, uniflori, ad medium vel infra articulati. Calyx glaber, tubulosus, basi saccatus, 8.5—11.5 mm longus, dentibus tubo 3—4-plo brevioribus, deltoides, acutis vel acuminatis, marginibus tomentosis; corolla 17—24 mm longa, lutea, vexillum obovatum ungue lamina 2—2.5-plo breviore, alae unguibus longis, angustis laminae subaequilongis auriculisque brevibus, ungue 4—5-plo brevioribus, carina obtusa, ovarium glabrum; legumen 17—23 mm longum, 2—2.5 mm latum, lineare.

Habitat: in declivibus siccis stepposis et lapidosis Rossiae australis.

Typus: Rossia australi, in declivibus apricis sinus Sivasch, prope Perekop, 23 IV (fl.) et 15 V (fr.) 1901, O. Egorova.

Affinitas: a *C. grandiflora* (M. B.) DC. floribus minoribus, ramulis ramisque tenuissimis, brevissimis, subinermibus dignoscitur.

19. **C. kirghisorum** Pojark. sp. nova.

Frutex ramosissimus 0.3—1 m altus, ramulis juvenilibus glabris, annotinis lutescente-cinerascentibus usque ad albidis costatis cum ramis vetustioribus lineis suberosis elevatis ornatis; stipulae ramorum sterilium induratae pungentes, ad 3 mm longae; petioli in ramis sterilibus 3—13 mm longi, apiculati, indurati, incrassati, saepe recurvati, ramorum axillarium autem breviores, decidui; folia bijuga, foliolis digitatim approximatis, cuneatis, oblanceolatis, plerumque acutis, apiculatis, pedunculi uniflori, 6—8 mm longi, glabri. Calyx glaber plus minusve purpurascens, longe tubulosus, basi valde saccatus, 12—15 mm longus, dentibus triangularibus, latis (2.5 mm longis, 2.5—3.5 mm latis) vulgo glabris; corolla 27—32 mm longa, lutea, marcescendo purpurascens, vexillo 13—17 mm lato, obovato, basi sensim angustato, apice rotundato vel emarginato, alis sursum dilatatis ungue laminae subaequilongo vel vix breviore, auriculaque brevi, carina obtusa, ungue lamina sesqui brevior et auricula brevi; ovarium glabrum; legumen 2.5 mm longum, 2.5 latum, lineare acuminatum.

Habitat: in declivibus lapidosis et argillosis montium, fluviorum et lacum Asiae Mediae.

Typus: Tian-schan centralis, ad lacum Issyk-kul, 16 V 1889, Roboovski (fl.).

Affinitas: Haec species *C. grandiflorae* (M. B.) DC. simillima, a qua dentibus calycinis brevioribus latioribusque bene differt.

20. **C. stenophylla** Pojark. sp. nova.

Frutex humilis, 15—70 cm altus, spinosus, cortice viridi-griseo usque ad lutescente-fusco, ramulis tenuibus brevibus costatis, in juventute pubescentibus, stipulae in ramis sterilibus ad 3 mm longae, induratae, aciculares, petioli ad 7 mm longe persistens, hi et illae in spinas erectas vel recurvatas mutati; folia bijuga, foliolis digitatim approximatis, glauco-viridibus, adpresse pilosis vel fere glabrís, brevibus, 4—11 mm longis, 0.75—1.5 mm latis, anguste lineari-oblanceolatis, acuminatis, apiculatis, plus minusve plicatis; pedunculi solitarii, foliis breviores, 5—10 mm longi, infra medium articulati. Calyx glaber, rarius sparse pilosus, campanulato-tubulosus, 5—6.5 mm longus, dentibus triangularibus, tubo 4-plo brevioribus; corolla lutea, 14—17 (20) mm longa, vexillo cum lamina orbiculata vel late obovata in unguem brevissimum (5-plo lamina breviorem) subito contracto, alis sursum dilatatis obliquis cum ungue 2—2.5-plo lamina breviore, auricula calcareiformi, ungue 2—2.5-plo breviore, carina longius unguículata (sesquialter, rarius duplo lamina breviore, rarius eí aequilonga), auricula brevi, obtusa; ovarium glabrum; legumen 2—2.5 cm longum, 2.5—3 mm latum, lineare.

Habitat: in steppis arenosis argillosisque, in alveis fluviorum siccis, in declivibus lapidosis argillosisque montium Dauriae australis (ad. fl. Argun), Mongoliae orientalis, Mandschuriae occidentalis et Chinae borealis.

Typus: Mandschuria occidentali, in planitie Kulun-buin-nor in collibus Chara-tologoi in saxosis, 7 VI 1899, Potanin et Soldatov (fl.)

Affinitas: *C. pygmaea* (L.) DC. habitu similis, a qua calycibus minoribus latioribusque, ovario glabro et corticis colore recedit.

21. **C. altaica** (Kom.) Pojark. sp. nova.

Frutex ramosissimus, ramulis rubro-fuscis virgatis, costatis, in juventute appresse pilosis, ramorum vetustorum cortice brunneo; stipulae ad 6 mm longae, induratae; petioli in ramis sterilibus remanentes, pungentes, ad 10 mm longi; folia bijuga, foliolis digitatim fasciculatis atriviridibus, concoloribus, glabris, lucidis, planis, obovatis, obtusis vel breviter acutis, apiculatis 6—19 mm longis, 1.5—2.25 mm latis, nonnunquam (lusus a. *latifolia* Kom.) ad 23 mm longis et 3 mm latis; pedunculi foliis breviores, glabri, ad medium vel paulo infra articulati. Calyx glaber campanulati-tubulosus, sursum conspicue ampliatus, 6—7 mm longus, 4.5—6 mm latus, dentibus ovato-triangularibus, acutis, 1.5—2 mm longis; corolla lutea, post anthesin rubescens, 18—20 mm longa vexillo obovato vel orbiculato-rhomboideo, in unguem brevissimum subito contractum, alarum lamina angusta (4:1) vel latiore (2.5:1), earum ungue lamina 1.5—2-plo breviore, auricula brevi, ungue 4—5-plo breviore, carina vix auriculata cum ungue lamina 1.5—2-plo breviore; ovarium glabrum, lineare; legumen 2.5—4 cm longum, 2.5—3.5 (4) mm latum.

Habitat: in rupibus declivibusque lapidosis montium Sibiriae occidentalis (in Altai et in parte jugi Sajanensis occidentali).

Typus: Altai, in rupibus, prope pag. Schabalina, 26 VI 1906, E. Klementz, fl. (exs.: Herb. Fl. Ross. n° 508, sub *C. pygmaea*).

Affinitas: a *Caragana pygmaea* (L.) DC. characteribus subsequentibus bene differt: calycis forma et magnitudine, ovario glabro, foliorum forma coloreque et cortice atricinereo.

22. **C. pumila** Pojark. sp. nova.

Frutex humilis 20—40 cm altus, ramosissimus, spinosus, cortice griseo-virescenti vel fusco-virescenti tectus, ramulis tenuibus, erectis, dense foliatis, in juventute pubescentibus, in ramis sterilibus stipulae 3—5 mm longae, petioli ad 9 mm longi, hi et illae cito se indurantes atque in spinas tenues aciculares, nonnunquam recurvatas se mutantes; folia bijuga, foliolis digitatim fasciculatis, anguste vel lineari-oblanceolatis, apice acuminatis vel obtusiusculis, apiculatis, subtus plus minusve purpurascentibus, utrinque appresse pilosis, 3—12 mm longis, 0.75—1.5 (2) mm latis; pedunculi 2.5—12 mm longi, pubescentes, ad medium vel infra articulati. Calyx glaber, tubuloso-campanulatus, sursum conspicue dilatatus, 5.5—7.5 mm longus, 3.5—4.5 mm latus, dentibus deltoideis sensim acuminatis, sinibus interjacentibus; corolla 13—20 mm longa, lutea extrema anthesi rubens, vexillo late obovato in unguem 3.5—5-plo lamina breviorem gradatim attenuato, alis angustis (3—3.5:1), sursum dilatatis, ungue lamina 2.5—3-plo breviore, auricula calcareiformi ad $^1/_3$—$^1/_2$ ungue breviore, carina cum lamina ungue illius duplo breviore, ovarium glabrum, legumen usque ad 2.5 cm longum et 2.5 mm latum.

Habitat: in declivibus stepposis, pratensibus lapidosique montium minus elevatorum Kazakhstaniae boreali-orientalis, orientalis, centralisque.

Typus: Kazakhstania borealis, distr. Pavlodar prope Chelak-kujandy in pratis stepposis, 13 V 1914 S. Kuczerovskaja, n° 1585 (fl.).

Affinitas: haec species ad *Caraganam leucophloiam* proxime accedit, a qua statura breviore, corticis colore, spinis tenuibus, foliolis angustioribus atroviridibus acuminatisque, calyce angustiore, nec non alarum auriculis brevioribus dignoscitur.

23. **C. leucophloia** Pojark. sp. nova.

Frutex usque ad 1 mm latus, ramis divaricatis saepe angulatis, sparse foliatis, cortice albo-lutescente tectis lineisque elevatis suberosis longitudinalibus ornatis, ramulis hornotinis brevibus, adpresse pilosis; in ramis axillaribus stipulae petiolique decidui, ramorum sterilium autem indurati, in spinas validas basi incrassatas recurvatas mutatae; folia bijuga, foliolis digitatim fasciculatis, glaucis, nonnunquam plus minusve rubescentibus, lucidis, glabris vel sparse appresse pilosis, planis, anguste oblanceolatis, obtusis vel acutiusculis, apiculatis, 4—12 mm longis, 1—2 (2.5) mm latis; pedunculi 3—8 (10) mm longi, infra medium articulati. Calyx tubulosi-campanulatus, 5—6 mm longus, 3.5—4 (4.5) mm latus, dentibus triangularibus acutis vel acuminatis, corolla lutea, 13—18 mm longa, vexillo cum lamina obovata, in unguem brevem (4—5 (6)-plo lamina breviorem) attenuata, alis saepius angustis (4:1) marginibus parallelis vel rarius latioribus (2.5—3:1), marginibus sursum dilatatis ungue lamina 3—3.5-plo breviore et auricula 2.5—3.5 mm longa (quam ungue $^1/_3$—$^1/_2$ breviore vel rarius autem huic subaequilonga), carina alis latiore, ungue lamina 3—3.5-plo breviore; ovarium glabrum; legumen lineare, 3—3.5 mm longum, 2—3.5 (4) mm latum.

Habitat: in declivibus lapidosis et saxosis, in desertis argillosis lapidosisque in glareosis alveis siccis Asiae Mediae (in montibus: Saur, Tarbagatai, Alatau, Tianschan orientalis centralisque, incluso Tian-schan chinensis), nec non in Mongolia occidentalis centralisque.

Typus: Kazakhstania, in jugo Transiliensis in montibus Sjugaty, in alveis siccis, 1 VI 1937, M. Popov.

Affinitas: haec species *Caragana aurantiaca* Koehne cortice albido, corolla minore, angustioreque, alarum auricula breviore et foliolis minoribus planis differt, a *Caragana pumila* Pojark. autem dignoscitur statura altiore, spinis robustioribus, foliolis latioribus glaucisque, corticis colore, calyce latiore et alarum auricula longiore.

24. **C. alaica** Pojark. sp. nova.

Frutex ramulis, ramis valde spinosis, longitudinaliter costatis atque lineatis, cortice ramorum vetustiorum fusco vel virescenti-cinereo; in ramulis sterilibus stipulae 2—4.5 mm longae, petioli 4—8 mm longi induratae et in spinas incrassatas mutatae, in ramulis axillaribus autem petioli vulgo brevissimi, inconspicui, nonnunquam 2—3 mm longi, caduci; folia bijuga, foliolis 5—15 mm longis, 1.5—4.5 mm latis, glabris, glaucis, cuneato obovatis, angustis (3.5:1) vel latioribus (2.5:1), apice rotundatis, emarginatis, breviter apiculatis, deorsum sensim attenuatis; peduncli tenues, glabri, foliolis longioribus, 1—1.5 (2) cm longi, supra medium articulati. Calyx glaber, tubulosi-campanulatus, sursum parum dilatatus, basi gibbosus, 5—6 (8) mm longus, 4—5 (6) mm latus, dentibus triangularibus, aculeatis, corolla lutea, vexillo 14—20 (22) mm longo, orbiculato-obovato, in unguem brevem (lamina 4—5-plo breviore), subito attenuato, alae et carina 17—19 (22) mm longa, ungue lamina duplo breviore et auricula ungue 3—4 (5)-plo breviore; ovarium glabrum, líneare, legumen 25—37 mm longum, 3.5—4 mm latum.

Habitat: in declivibus lapidosis montium angustiarum et riparium elevatarum Asiae Mediae (in declivibus septentrionalibus jugi Alaici, in jugo Turkestanico nec non in montibus Malguzaricis).

Typus: Kirghizia, in jugo Alaico, in angustiis fl. Lailak (Chodshent, darja), 1 VI 1913, Z. Minkwitz, n° 726.

Affinitas: ab omnibus speciebus affinibus (seriei *Pygmaeae*) discrepat: folliis multo latioribus, calýceque basi gibboso, a speciebus Asiae Mediae autem insuper auricula alarum breviore bene differt.

25. **C. dasyphylla** Pojark. sp. nova.

Frutex ramosissimus, valde spinosus, cortice subfusco, ramulis annotinis satis robustis et non raro conspicuo nodosis, stipulae pungentes aculeatae; folia bijuga, in ramis sterilibus pinnata, petiolis crassis, 1—2.5 cm longis in spinas validas mutatis, ramorum axillaribus autem foliola palmatim fasciculata, petiolis brevibus 2—3 mm longis, tenuibus, pubescentibus, caducis; foliola utrinque (supra densíus) appresse pilosa, glaucescentia, obovata, vulgo obtusa, 2.5—12 mm longa, 2—3.5 mm lata; pedunculi 2—4 mm longi, ad basin artíсulati, dense pilosi. Calyx 6—7 mm longus, tubuloso-campanulatus, basi non dilatatus, breviter pubescens, dentibus deltoideis, brevibus (tubo 4-plo brevioribus); corolla pallíde lutea vel vitelina, 16—18 mm longa, vexillo suborbiculato vel late-obovato in unguem 3 mm longum contracto, alis obtusis sursum dilatatis, ungue lamina (2.5) 3-plo breviore et auricula lineari ungue subaequilonga, carina apice acute rostrata, auricula minima obtusa praedita; ovarium glabrum lineare; legumen lineare 22—26 mm longum, 2.5—2.8 mm latum; semina anguste-elliptíca, viridia.

Habitat: in declivibus siccis jugi Tian-schan orientalis (prope opp. Bai) et Kaschgariae (in jugo Sary-kol).

Typus: Kaschgaria in jugo Sary-kol ad stationem Bostan-terek, 10 VII 1929, M. Popov, n° 140 (cum fructibus floribusque marcidis).

Affinitas: haec species eximie aberrans primo aspectu *Caraganam pruinosam* Kom. admonens, tàmen ab hac calyce et corolla abest, calyce ac corolla autem *Caraganam aurantiacam* Koehne et *C. leucophloiam* Pojark. aemulans.

26. **C. Bongardiana** (Fisch. et Mey.) Pojark. sp. nova.

Frutex 50—100 cm altus, cortice fulvo, longitudinaliter rimoso, ramulis tenuibus pubescentibus, costatís; stipulae lineari-lanceolatae, aculeatae, induratae, persístentes; folia pinnata, plerumque trijuga, vel rarius bijuga, petiolis pilosis, tenuibus in ramis sterilibus usque ad 20 mm longis, ramulorum axillarium autem 10—15 mm longis, omnibus persistentibus, in spinas erectas tenuesque mutatis; foliola sessilía, utrinque dense adpresse pilosa, anguste-vel lineari-oblanceolata, obtusa vel acuta, apiculata, 7—15 mm longa, 1.5—3.5 mm lata; pedunculi uniflori, rarius biflori, ad basin articulati, 2.5—6 mm longi, dense villoso-tomentosi. Calyx longe tubulosus, deorsum, non angustatus, 14—17 mm longus, extus villoso-tomentosus, dentibus anguste deltoideis, aculeatis, tubo 3—4-plo brevioribus, corolla lutea 27—30 mm longa, vexillo late obovato, in unguem subaeguilongum attenuato, alis lamina angusta (3.5:1) lineari, ungue subaequilongo laminae ac auricula lineari, quam unguis duplo breviore, nonnunquam etiam extus in alarum lamína auriculam accessorium breviorem habente; carina apice acute rostrata ungue lamina paulo longiore et auricula brevi praedita; ovarium appresse pilosum.

Habitat: in declivibus siccis et in steppis prope lacum Zaisan in Kazakhstania orientali.

Typus: ad lacum Zaisan legit Bongard.

Affinitas: a *Caragana tragacanthoide* (Pall.) Poir., quae hybrida inter *C. Bongardianam* (F. et M.) Pojark. et *C. hololeucam* Bge. videtur, recedit floribus multo majoribus, spinis ramorum sterilium erectis, tenuibus (non recurvatis, robustis), ramorum axillarium autem numerosis, longioribus.

27. **C. pleiophylla** (Rgl.) Pojark. sp. nova.

Frutex ramosissimus valde spinosus, dense frondosus, 50—100 (200) cm altus, cortice fusco vel cinereo-lutescenti tectus, ramulis juvenilibus albidis, villoso tomentosis; stipulae deltoideo-lanceolatae, deorsum coriaceis, villosis, sursum longe acuminatis, pungentibus, cito se indurantibus; folia pinnata 4—6-juga, petiolís villosis, apiculatis, induratis, omnibus in spinas erectas, 1.5—4 cm longas, mutatis; foliola breviter petiolulata (petiolulis 0.75 mm longis), firma, subcoriacea, laete viridia, utrinque appresse pilosa, rarius villosa, oblonge-obovata vel oblanceolata vel elliptica, acuminata, apiculata, basi cuneata; pedunculi uniflori, 5—7 mm longi, ad basin articulati, villosi. Calyx longe tubulosus, deorsum non contractus, 15—21 mm longus, extus villoso tomentosus, dentibus magnis (tubo 1.5—2.5-plo brevioribus), anguste deltoideis, acuminatis, pungentibus; corolla 30—36 mm longa, lutea, vexillo elliptico ovato, obtuso, in unguem brevem (lamina 2.5-plo breviorem) attenuato, alis linearibus, angustis (6—7:1), apice acuminatis vel obtusis, ungue amina 1.5-plo breviore, auricula lineari, ungue 2—2.5-plo breviore, nonnunquam etiam extus auricula accessoria praeditis; carina apice in rostrum incurvum attenuata, instructa ungue subaequilongo, lamina et auricula brevi; ovarium villosum; legumen calyce 2.5 (3)-plo brevius, 30—35 (40) mm longum, 5—7 mm latum, villosum.

Habitat: ín declivibus siccis, plerumque lapidosis montium et riparium Asiae Mediae, in Tian-Schan orientali, centralique et in declivibus septentrionalibus jugi Alaici.

Typus: Asia Media, ad lacum Issyk-kul, prope Karakol, 1886, leg. Krassnov, fl.

Affinitas: differt a *C. Bongardiana* (F. et M.) Pojark. floribus majoribus, foliis 4—6-jugis, foliolis latioribus et pubescentia diversa.

28. **C. laetevirens** Pojark, sp. nova.

Frutex valde spinosus, cortice nigrescente, ramentaceo, scabro, ramulis crassis densissime frondosis undique petiolos persistentes horridis, eis hornotinis stipulis numerosis magnis, coriaceis, cano sericeis appresse pubescentibus imbricatim tectis; petioli in juventute cano sericei dense pilosi, cito se indurantes et omnes in spinas erectas, 2—3.5 cm longas mutatis; folia 3—4-juga, foliolis firmis, anguste ellipticis vel oblongo-oblanceolatis, acutis, apiculatis, basi breviter cuneatis, 10—17 mm longis, 2—4.5 mm latis, glaucescentibus utrinque appresse et tenuiter pilosis, margine tantum patentim pilosis petiolulis brevissimis, 0.5 mm longis; pedunculi solitarii, pilosi, breves, 6 mm non excendentes, ad basin articulati. Calyx campanulato-tubulosus deorsum contractus, conicus, extus plus minusve villosus, 14—16 mm longus, 7 mm latus, dentibus lanceolatis, acuminatis, tubo 2.5—3-plo brevioribus; corolla 25—30 mm longa; vexillo obovato in unguem longum sensim attenuato; alis lamina fere deltoidea, sursum dilatata, ungue aequilongo laminae vel ea ad quartam partem breviore, auricula calcareiformi, ungue 3—4-plo breviore; carina apice rostrum obtusiusculum et incurvum formantes et auricula brevissima praedita; ovarium ovatum cinereum appresse pilosum; legumen latum, 2.2—2.5 mm longum, calyce 1.5-plo breviore.

Habitat: in dumetis Asiae Mediae (in jugo Turkestanico).

Typus: Kirghizia, in jugo Turkestanico: in systemate fluvii Sokh, in declivibus ripae dextrae fl. Kalai-makhmud, in adscensu a statione Kul in stationem Kisil-uczuk, 12 VII 1912, Z. Minkwitz, n° 965 (cum fructibus juvenilibus et foliorum marcidis).

Affinitas: differt a *Caragana jubata* (Pall.) Poir. alarum carinaque auricula breviore, foliorum jugis in numero minore, foliolis laete glaucescentibus (non atroviridibus), firmis, pubescentia appressa sericea (non lanuginosa) et spinis brevioribus robustioribus, a *C. hoplite* Dunn. autem alarum auricula breviore, nervisque foliolorum non prominentibus.

CHESNEYA LINDL.

29. **C. kopetdaghensis** Boriss. sp. nova.

Radix longa, lignosa, solitaria. Planta herbacea, 5—10 (15) cm alta, saepe subacaulis, vel caulibus brevibus ad 5—10 cm longis tota dense sericea, pilis brevibus patentibus vestita in statu magis juvenili albipilosa. Stipulae herbaceae, ovatae pubescentes, 3—4 mm longae. Folia 4—5 (6)-juga imparipinnata, 5—9 cm longa, petiolis dense patentipilosis, foliolis ellipticis vel obovatis dense sericei pubescentibus, apice obtusis emarginatisve (3) 5—10 mm longis, (2) 3—7 mm latis. Pedunculi foliis multo breviores, 1—1.5 (2.5) cm longi, uniflori, bracteis vix conspicuis. Flores magni (15) 21—25 mm longi. Calyx sericeus, anguste tubulosus, 11—13 (15) mm longus, dentibus ovati-triangularibus, inaequalibus tubo duplo brevioribus. Corolla lutescenti-violacea duplo calyce longior. Vexillum (15) 21—26 mm longum, supra pubescens, carina et alis longius, lamina rotundata ejus unguem angusti-cuneatum subaequante. Alae (13) 16—23 mm longae, laminis ovati-ellipticis, obtusis (5) 9 mm longis et (4) 5 mm latis, basi vix auriculatis, unguibus filiformibus, lamina longioribus. Carina (12) 20 mm longa, lamina 6—7 mm longa et 3—5 mm lata, apice sub angulo recto incurvata, unguibus filiformibus. Legumen 6—9.5 longum et 4—5 mm latum, anguste lineare, breviter acuminatum, sericeum, album, patentim molliterque pubescens. Semina reniformia, complanata, foveolata, tuberculati-rugosa, 5 mm longa, 3 mm lata. Fl. IV—V; fr. V—VIII.

Habitat: in declivibus siccis lapidosis et lapidosi-argillosis atque in schistosis jugo Kopet-dagh occidentalis et centralis.

Typus: jugus Kopet-dagh, in angustiis Bekrovinskoje prope Ashabad, in declivibus lapidosis 21 IV 1930, fl., leg. Androssov.

Affinitas: *Chesneyae astragalinae* Jaub. et Spach propinqua, sed oliolis floribus, leguminibusque forma et magnitudine differt.

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VEGETATION REGIONS OF THE USSR

Abbreviated name	Full name
I. Arctic	
1. Arc.Eur.	Arctic (European part)
2. Nov.Z.	Novaya Zemlya
3. Arc.Sib.	Arctic (Siberia)
4. Chuk.	Chukchi
5. An.	Anadyr
II. European part	
6. Kar.-Lap.	Karelia-Lapland
7. Dv.-Pech.	Dvina-Pechora
8. Balt.	Baltic States
9. Lad.-Ilm.	Ladoga-Il'men
10. U.V.	Upper Volga
11. V.-Kama	Volga-Kama
12. U.Dnp.	Upper Dnieper
13. M.Dnp.	Middle Dnieper
14. V.-Don.	Volga-Don
15. Transv.	Transvolga area
16. U.Dns.	Upper Dniester
17. Bes.	Bessarabia
18. Bl.	Black Sea area
19. Crim.	Crimea
20. L.Don	Lower Don
21. L.V.	Lower Volga
III. Caucasus	
22. Cisc.	Ciscaucasia
23. Dag.	Dagestan
24. W.Transc.	Western Transcaucasia
25. E.Transc.	Eastern Transcaucasia
26. S.Transc.	Southern Transcaucasia
27. Tal.	Talysh
IV. West Siberia	
28. Ob.	Ob region (from the eastern slopes of the Urals to the Yenisei River)

29.	U.Tob.	Upper Tobol
30.	Irt.	Irtysh
31.	Alt.	Altai

V. East Siberia

32.	Yenis.	Yenisei
33.	Lena-Kol.	Lena-Kolyma
34.	Ang.-Say.	Angara River-Sayans
35.	Dau.	Dauria

VI. Far East

36.	Kamch.	Kamchatka
37.	Okh.	Okhotsk
38.	Ze.-Bu.	Zeya-Bureya
39.	Uda	Uda River area
40.	Uss.	Ussuri
41.	Sakh.	Sakhalin

VII. Soviet Central Asia

42.	Ar.-Casp.	Aral-Caspian
43.	Balkh.	Lake Balkhash area
44.	Dzu.-Tarb.	Dzungaria-Tarbatagai
45.	Kyz.K.	Kyzyl-Kum
46.	Mtn.Turkm.	Mountainous part of Turkmenistan
48.	Amu D.	Amu Darya
49.	Syr D.	Syr Darya
50.	Pam.-Al.	Pamir-Alai
51.	T.Sh.	Tien Shan

Accepted Regions for Indication of General Distribution of Species Appearing in "Flora of the U.S.S.R"

I.	Arc.	Arctic (Spitsbergen, Greenland and farther)
II.	Scand.	Scandinavia (Norway, Denmark, Sweden, Finland)
III.	Centr.Eur.	Central Europe (Germany, Poland, Czechoslovakia, Hungary, Austria, Switzerland)
IV.	Atl.Eur.	Atlantic Europe (Netherlands, Belgium, England, France, Portugal)
V.	Med.	Mediterranean (including North Africa)
VI.	Bal.-As.Min.	Balkan Peninsula and Asia Minor
VII.	Arm.-Kurd.	Lesser Armenia and Kurdistan
VIII.	Iran	Iran and Afghanistan

IX.	Ind.-Him.	India and Himalayas
X.	Dzu.-Kash.	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)
XI.	Mong.	Mongolia
XII.	Jap.-Ch.	Japan and China
XIII.	Ber.	North American coast of the Bering Sea
XIV.	N. Am.	North America (U.S.A. and Canada)
XV.	Tib.	Tibet

Other Geographical Abbreviations

Afr.	Africa
Aust.	Australia
Centr.	Central
E.	East(ern)
Gr.	Great, Greater
I.	Island
Is.	Islands
Mt.	Mount
Mts.	Mountains
N.	North(ern)
R.	River
S.	South(ern)
W.	West(ern)

TRANSLATOR'S NOTE

1. The Russian term "Srednyaya Aziya" is, in English, Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya," which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

2. According to Russian usage, the European part of the USSR is "eastern Europe." Therefore "western Europe" includes the whole of Europe outside the USSR.

EXPLANATORY LIST OF ABBREVIATIONS OF RUSSIAN INSTITUTIONS AND PERIODICALS APPEARING IN THIS TEXT

Abbreviation	Full name (transliterated)	Translation
Bot.-geogr. issled. v Turkest.	Botaniko-geograficheskie issledovaniya v Turkestane	Botanical and Geographical Investigations in Turkestan
Bot. Mat. Gerb Bot. inst. AN SSSR	Botanicheskie Materialy Gerbariya Botanicheskogo instituta AN SSSR	Botanical Materials of the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR
Bot. Mat. Gerb. Gl. Bot. Sada	Botanicheskie Materialy Gerbariya Glavnogo Botanicheskogo Sada	Botanical Materials of the Herbarium of the Main Botanical Gardens
Bot. zap. SPb. univ.	Botanicheskie zapiski Sankt-Peterburgskogo universiteta	Botanical Notes of St. Petersburg University
Bot. zhurn. SSSR	Botanicheskii zhurnal SSSR	Botanical Journal of the USSR
Byull. Glavn. Bot. Sada	Byulleten' Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Byull. Obshch. lyubit. estestvozn., antrop. i etnogr.	Byulleten' Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Byull. Voronezh. obshch. estestv.	Byulleten' Voronezhskogo obshchestva estestvoispytatelei	Bulletin of the Voronezh Society of Naturalists
Dendr.	Dendrarii	Arboretum
Der. i kust.	Derev'ya i kustarniki	Trees and Shrubs
Der. i kust. Kavk.	Derev'ya i kustarniki Kavkaza	Trees and Shrubs of the Caucasus
Dikie polezn. i technich. rasteniya SSSR	Dikie poleznye i tekhnicheskie rasteniya SSSR	Useful Wild Plants and Industrial Crops of the USSR
Dikorastushchie r. Kavkaza, ikh rasprostranenie, svoistva i primenenie	Dikorastushchie rasteniya Kavkaza, ikh rasprostranenie, svoistva i primenenie	Wild Plants of the Caucasus, Their Distribution, Properties and Uses
Dokl. AN Azerb. SSR	Doklady Akademii Nauk Azerbaidzhanskoi SSR	Reports of the Academy of Sciences of the Azerbaijan SSR

Fl.	Flora	Flora
Fl.Abkh.	Flora Abkhazii	Abkhasian Flora
Fl.Almat. zapovedn.	Flora Alma-Atinskogo zapovednika	Flora of the Alma-Ata Reserve
Fl.Alt.	Flora Altaya	Altai Flora
Fl.Alt.i Tomsk. gub.	Flora Altaiskoi i Tomskoi gubernii	Flora of Altai and Tomsk Provinces
Fl.Az.Ross.	Flora Aziatskoi Rossii	Flora of Asiatic Russia
Fl.Evrop.Rossi	Flora Evropeiskoi Rossii	Flora of European Russia
Fl.Gruzii	Flora Gruzii	Georgian Flora
Fl.Kamch.	Flora Kamchatki	Kamchatkan Flora
Fl.Kavk.	Flora Kavkaza	Caucasian Flora
Fl.Man'chzh.	Flora Man'chzhurii	Manchurian Flora
Fl.Mosk.gub.	Flora Moskovskoi gubernii	Flora of Moscow Province
Fl.Poles'ya	Flora Poles'ya	Flora of Polesie
Fl.Sev.Kraya	Flora Severnogo Kraya	Flora of the Northern Territory
Fl.Sakh.	Flora Sakhalina	Flora of Sakhalin
Fl.Sib.	Flora Sibiri	Siberian Flora
Fl.Sib.i Dal'n. Vost.	Flora Sibiri i Dal'nego Vostoka	Flora of Siberia and the Far East
Fl.Sr.i Yuzhn. Ross.	Flora Srednei i Yuzhnoi Rossii	Flora of Central and Southern Russia
Fl.Sr.Ross.	Flora Srednei Rossii	Flora of Central Russia
Fl.Tadzhik.	Flora Tadzhikistana	Flora of Tadzhikistan
Fl.Talysh.	Flora Talysha	Talysh Flora
Fl.Tsentr. Kazakhst.	Flora Tsentral'nogo Kazakhstana	Flora of Central Kazakhstan
Fl.Vost.Evr. Ross.	Flora Vostochnoi Evropeiskoi Rossii	Flora of East European Russia
Fl.Yugo-Vost.	Flora Yugo-Vostoka	Flora of the Southeast
Fl.Yugo-zap. Ross.	Flora Yugo-zapadnoi Rossii	Flora of Southwest Russia
Fl.Yur. Bot.-sada	Flora Yur'evskogo botanicheskogo sada	Flora of Yur'ev Botanical Garden
Fl.Zap.Sib.	Flora Zapadnoi Sibiri	Flora of West Siberia
Gerb.donsk.fl.	Gerbarii donskoi flory	Herbarium of Don Flora
Gern.Orlovsk. gub.	Gerbarii Orlovskoi gubernii	Herbarium of Orel Province
Gerb. Ukr. fl.	Gerbarii Ukrainskoi flory	Herbarium of Ukrainian Flora
GRF	Gerbarii Russkoi Flory	Herbarium of Russian Flora
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora Moskovskoi gubernii	Illustrated Flora of Moscow Province
Izv. AN SSSR	Izvestiya AN SSSR	Bulletin of the Academy of Sciences of the USSR
Izv. Bot. Sada	Izvestiya Botanicheskogo Sada	Bulletin of the Botanical Gardens

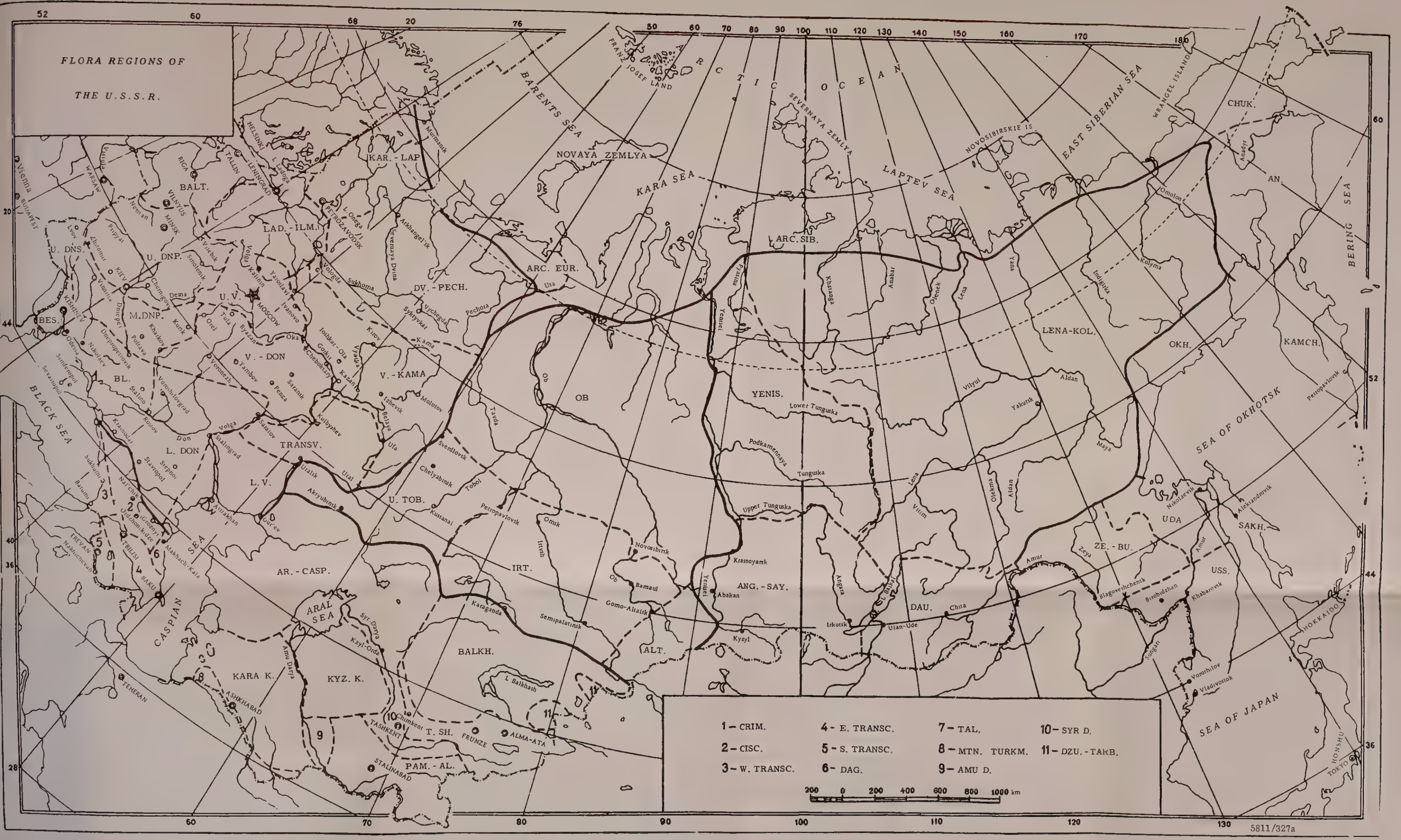
Izv. Bot. Sada Petra Vel.	Izvestiya Botanicheskogo Sada Petra Velikogo	Bulletin of Peter the Great Botanical Gardens
Izv. Gl. Bot. Sada	Izvestiya Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Izv. Kavk. Muzeya	Izvestiya Kavkazskogo Muzeya	Bulletin of the Caucasian Museum
Izv. Kazakhst. fil. AN SSSR	Izvestiya Kazakhstanskogo Filiala Akademii Nauk SSSR	Bulletin of the Kazakhstan Branch of the Academy of Sciences of the USSR
Izv. Kievsk. Bot. Sada	Izvestiya Kievskogo Botanicheskogo Sada	Bulletin of the Kiev Botanical Gardens
Izv. Obshch. lyubit. estestvozn., antrop. i etnogr.	Izvestiya Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Izv. Obshch. Sadov.	Izvestiya Obshchestva Sadovodov	Bulletin of the Horticulturists' Society
Izv. Tadzhik. Bazy AN SSSR	Izvestiya Tadzhikskoi Bazy Akademii Nauk SSSR	Bulletin of the Tadzhikistan Base of the Academy of Sciences of the USSR
Konsp. rast. okr. Khar'kova	Konspekt rastenii okruga Khar'kova	Compendium of Plants of Kharkov District
Korm. rast. Estestv. senokosov i pastb. SSSR	Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR	Fodder Plants of Natural Hay Meadows and Pastures of the USSR
Lesn. zhurn.	Lesnoi zhurnal	Forestry Journal
Mat. (dlya) Fl. Kavk.	Materialy dlya Flory Kavkaza	Materials on Caucasian Flora
Mat. (dlya) fl. Sredn. Azii	Materialy dlya flory Srednei Azii	Materials on Soviet Central Asia Flora
Mat. (dlya) Fl. stepei Khersonsk. Gub.	Materialy dlya Flory Stepei Khersonskoi Gubernii	Materials on the Flora of Kherson Province Steppes
Nov. obozr.	Novoe obozrenie	New Review
Ob. rast. Kievsk. uch. okr.	Obzor rastitel'nosti Kievskogo uchebnogo okruga	Survey of Vegetation in the Kiev Educational District
Obz. Krym.-Kavk. Medicago	Obzor Krymsko-Kavkazskogo Medicago	Survey of Crimean-Caucasian Medicago
Och. obozr. i fl. Karpat	Ocherki rastitel'nosti i flory Karpat	Survey of Carpathian Vegetation and Flora
Ocherk. Tifl. fl.	Ocherki Tiflisskoi flory	Survey of Tiflis [Tbilisi] Flora
Opis. Amur. obl.	Opisanie Amurskoi oblasti	Description of the Amur Region
Opis. ist. razv. fl. vost. Tyan'-Shanya	Opisanie istorii razvitiya flory vostochnogo Tyan'-Shanya	Description of the History of the Development of Flora of Eastern Tien Shan

Opis. nov. rast. Turk.	Opisanie novykh rastenii Turkestana	Description of New Plants of Turkestan
Opis. nov. vidov	Opisanie novykh vidov	Description of New Species
Opred. der. i kust.	Opredelitel' derev'ev i kustarnikov	Key to Trees and Shrubs
Opred. rast. Dal'nevost. kr.	Opredelitel' rastenii Dal'nevostochnogo Kraya	Key to Plants of the Far Eastern Territory
Opred. rast. Kavk.	Opredelitel' rastenii Kavkaza	Key to Caucasian Plants
Opred. vyssh.	Opredelitel' vysshikh rastenii	Key to Higher Plants
Opred. (vyssh.) rasten. Evrop. chasti SSSR	Opredelitel' (vysshikh) rastenii Evropeiskoi chasti SSSR	Key to Higher Plants of the European USSR
Opyt Russko-Kavk. Fl.	Opyt Russko-Kavkazskoi Flory	Attempted Russian-Caucasian Flora
Perech. rast. Turk.	Perechen' rastenii Turkmenii	List of Turkmenian Plants
Pochv. eksped. v bass. r. Syr-Dar'i i Amu-Dar'i	Pochvennaya ekspeditsiya v basseiny rek Syr-Dar'i i Amu-Dar'i	Soil Science Expedition to the Syr-Darya and Amu-Darya River Basins
Priroda	Priroda	Nature
Protok. Zased. Kievsk. Obshch. Estesv.	Protokol Zasedaniya Kievskogo Obshchestva Estestvoispytatelei	Protocol of a Conference of Kiev Naturalists' Society
Putesh.	Puteshestviya	Travels
Rast. i fl. Karp.	Rasteniya i flora Karpat	Plants and Flora of the Carpathians
Rast. letn. pastb. Gandzh.	Rasteniya letnikh pastbishch Gandzhi	Vegetation of Gandzha [now Kirovabad] Summer Pastures
Rast. res. Turkm.	Rastitel'nye resursy Turkmenii	Plant Resources of Turkmenia
Rast. resursy Kavkaza	Rastitel'nye resursy Kavkaza	Plant Resources of the Caucasus
Rast. Sib.	Rastitel'nost' Sibiri	Vegetation of Siberia
Rast. Sr. Az.	Rastitel'nost' Srednei Azii	Vegetation of Soviet Central Asia
Rast. Turkest.	Rastitel'nost' Turkestana	Vegetation of Turkestan
Rast. Zakasp. obl.	Rastitel'nost' Zakaspiiskoi oblasti	Vegetation of the Transcaspian Region
Rastit. Kavk.	Rastitel'nost' Kavkaza	Vegetation of the Caucasus
Rastit. pokrov. vost. Pamira	Rastitel'nyi pokrov vostochnogo Pamira	Plant Cover of the Eastern Pamirs
Rastit. syr'e Kazakhst.	Rastitel'noe syr'e Kazakhstana	Plant Resources of Kazakhstan

Rastit. zapovedn. Guralash i Zaaminsk. lesn. ugodii	Rastitel'nost' zapovednika Guralash i Zaaminskikh lesnykh ugodii	Vegetation of Guralash Reserve and Zaamin Forest Lands
Rezul't dvukh puteshevstv. na Kavk.	Rezul'taty dvukh puteshestvii na Kavkaz	Results of Two Travels to the Caucasus
Russk. Fl.	Russkaya Flora	Russian Flora
Russk. lek. rast.	Russkie lekarstvennye rasteniya	Russian Medicinal Plants
Sbor, sushka i raz. lek. rast.	Sbor, sushka i razvitie lekarstvennykh rastenii	Gathering, Drying and Development of Medicinal Plants
Sorn. rast. SSSR	Sornye rasteniya SSSR	Weed Plants of the USSR
Sots. Rastenievodstvo	Sotsialisticheskoe Rastenievodstvo	Socialist Plant Growing
Sov. Bot.	Sovetskaya Botanika	Soviet Botany
Sov. Farmats.	Sovetskaya Farmatsevtika	Soviet Pharmaceutics
Spis. rast.	Spisok rastenii	List of Plants
Spis. Rast. Krymsk. Zapovedn.	Spisok Rastenii Krymskogo Zapovednika	List of Plants of the Crimean Reserve
Tr. Bot. inst. AN. SSSR	Trudy Botanicheskogo instituta AN SSSR	Transactions of the Botanical Institute of the Academy of Sciences of the USSR
Tr. Bot. Inst. Azerb. Filiala Akad. Nauk	Trudy Botanicheskogo Instituta Azerbaidzhanskogo Filiala Akademii Nauk	Transcations of the Botanical Institute of Azerbaijan Branch of the Academy of Sciences
Tr. Bot. Sada	Trudy Botanicheskogo Sada	Transactions of the Botanical Gardens
Tr. Bot. Sada Yur'evsk. Univ.	Trudy Botanicheskogo Sada Yur'evskogo Universiteta	Transactions of the Botanical Gardens of Yur'ev [now Tartu] University
Tr. Byuro prikl. Bot.	Trudy Byuro po prikladnoi botanike	Transactions of the Bureau of Applied Botany
Tr. Dal'nevost. bazy AN SSSR	Trudy Dal'nevostochnoi bazy AN SSSR	Transcations of the Far Eastern Base of the Academy of Sciences of the USSR
Tr. Inst. nov. lub. syr'ya	Trudy Instituta novogo lubyanogo syr'ya	Transactions of the Institute of New Fiber Raw Materials
Tr. Nauk.-Doslid. Inst. Bot. Khar. Derzh. Univ.	Trudy naukovo-doslidnoho instytutu botaniky Kharkivs'koho Derzhavnoho Universytetu	Transactions of the Botanical Research Institute of the Kharkov State University

Tr.Obshch.isp. prir.Khark'k. univ.	Trudy Obshchestva ispytatelei prirody Khar'kovskogo universiteta	Transactions of Naturalists' Society of Kharkov University
Tr.Obshch.sadov. v Odesse	Trudy obshchestva sadovodov v Odesse	Transactions of the Odessa Horticulturists' Society
Tr.odessk.obshch. sadov	Trudy Odesskogo obshchestva sadovodov	Transactions of Odessa Horticultirists' Society
Tr.Peterb. obshch.estestvoisp.	Trudy Peterburgskogo obshchestva estestvoispytatelei	Transactions of St. Petersburg Naturalists' Society
Tr.pochv.-bot. eksp.Peresl. upr.	Trudy pochvenno-botanicheskoi ekspeditsii Pereslavskogo upravleniya	Transactions of the Soil-Botanical Expedition of Pereslavl Administration
Tr.po geobot. obsled.pastb. Azerb.	Trudy po geobotanicheskim obsledovaniyam pastbishch Azerbaidzhana	Transactions of Geobotanical Investigations of Azerbaijan SSR Pastures
Tr.Odessk.otd.R. obshch.sadov.	Trudy Odesskogo otdeleniya Rossiiskogo obshchestva sadovodov	Transactions of Odessa Branch of the Russian Horticulturists' Society
Tr.prikl.bot.Tr (gen.i sel.)	Trudy po prikladnoi botanike, genetike i selektsii	Transactions of Applied Botany, Genetics and Selection
Tr.Ross.Obshch. sadov.	Trudy Rossiiskogo obshchestva sadovodov	Transactions of the Russian Horticulturists' Society
Tr.SAGU	Trudy Sredneaziatskogo Gosudarstvennogo Universiteta	Transactions of the Soviet Central Asian State University
Tr.Sarat. obshch.estestvoisp.	Trudy Saratovskogo obshchestva estestvoispytatelei	Transactions of the Saratov Naturalists' Society
Tr.Sil'skogospod.komit. bot.	Trudy sil'skohospodar'skoho komiteta botaniky	Transactions of the Botanical Agricultural Committee
Tr.SPb.obshch. estestv.	Trudy Sankt-Peterburgskogo obshchestva estestvoispytatelei	Transactions of the St. Petersburg Naturalists' Society
Tr.Tadzh.bazy AN SSSR	Trudy Tadzhikskoi bazy AN SSSR	Transactions of the Tadzhikistan Base of the Academy of Sciences of the the USSR
Tr.Tbil.bot. inst.	Trudy Tbilisskogo botanicheskogo instituta	Transactions of Tbilisi Botanical Institute
Tr.Tbil.(or Tifl.) bot.sada	Trudy Tbilisskogo (Tifliskogo) botanicheskogo sada	Transactions of the Tbilisi (Tiflis) Botanical Garden
Tr.Turkmensk. bot.sada	Trudy Turkmenskogo botanicheskogo sada	Transactions of the Turkmenian Botanical Garden

Tr. Turk. nauchn. obshch.	Trudy Turkmenskogo nauchnogo obshchestva	Transactions of the Turkmenian Scientific Society
Uchen. Zapiski Kazansk. Gos. Univ.	Uchenye Zapiski Kazanskogo Gosudarstvennogo Universiteta	Scientific Reports of the Kazan State University
Vest. Akad. Nauk. (or AN) Kazakhsk. SSR	Vestnik Akademii Nauk Kazakhskoi SSR	Bulletin of the Academy of Sciences of the Kazakh SSR
Vestn. estestv. nauk	Vestnik estestvennykh nauk	Bulletin of Natural Sciences
Vestn. Ross. Obshch. sadov	Vestnik Rossiiskogo obshchestva sadovodov	Bulletin of the Russian Horticulturists' Society
Vest. Tifl. bot. sada	Vestnik Tiflisskogo botanicheskogo sada	Bulletin of Tiflis Botanical Garden
Visn. Kyyivsk. bot. sadu	Visnyk Kyyivsk'koho Botanichnoho Sadu	Bulletin of the Kiev Botanical Garden
Vizn. (or Vznachn.) rosl. URSR	Viznachnyk roslyn URSR	Key to Plants of the Ukrainian SSR
V. obl. polupustyni	V oblasti polupustyni	(In the) Semidesert Region
Yadov. rast. lugov i pastb.	Yadovitye rasteniya lugov i pastbishch	Poisonous Plants of Meadows and Pastures
Yubil. sbornik V. L. Komarovu	Yubileinyi Sbornik Posvyashchennyi V. L. Komarovu	Jubilee Collection Dedicated to V. L. Komarov
Zam. po sist. i geogr. rast. Tbil. bot. inst.	Zametki po sistematike i geografii rastenii Tbilisskogo botanicheskogo instituta	Notes on Taxonomy and Geography of Plants of the Tbilisi Botanical Institute
Zam. o Rast. Russk. Flory	Zametki o Rasteniyakh Russkoi Flory	Notes on Plants of the Russian Flora
Zam. po fl. EL'T	Zametki po flore El'tona	Notes on the Flora of Elton
Zap. Kievsk. Obshch. Estestv.	Zapiski Kievskogo obshchestva estestvoispytatelei	Reports of the Kiev Society of Naturalists
Zap. Kyyivsk. Inst. Nar. Osv.	Zapysky Kyyivs'koho Instytututu Narodnoho Osvichennya	Reports of the Kiev Institute of Public Education
Zap. Nauchno-Prikl. Otd. Tifl. Sada	Zapiski Nauchno-Prikladnogo Otdeleniya Tifliskogo sada	Reports of the Applied Sciences Section of the Tiflis [Tbilisi] Botanical Garden
Zap. NOVOROSS. obshch. Estestv.	Zapiski Novorossiiskogo obshchestva estestvoispytatelei	Reports of the Novorossiisk Society of Naturalists
Zap. Russk. geogr. obshch.	Zapiski Russkogo geograficheskogo obshchestva	Reports of the Russian Geographical Society
Zhurn. Bot. obshch.	Zhurnal Botanicheskogo obshchestva	Journal of the Botanical Society
Zhurn. opytn. agron. Yugo-Vost.	Zhurnal opytnoi agronomii Yugo-Vostoka	Journal of Experimental Agronomy of the Southeast


FLORA REGIONS OF
THE U.S.S.R.
ARCTIC OCEAN
BARENTS SEA
KARA SEA
LAPTEV SEA
EAST SIBERIAN SEA
BERING SEA
SEA OF OKHOTSK
SEA OF JAPAN
BLACK SEA
CASPIAN SEA
ARAL SEA
FRANZ JOSEF LAND
NOVAYA ZEMLYA
SEVERNAYA ZEMLYA
NOVOSIBIRSKIE IS.
WRANGEL ISLAND
HOKKAIDO
HONSHU
KAR.-LAP.
BALT.
LAD.-ILM.
U. DNS.
U. DNP.
M.DNP.
U.V.
BES.
BL.
V.-DON
V.-KAMA
DV.-PECH.
ARC. EUR.
ARC. SIB.
L. DON
TRANSV.
L.V.
U. TOB.
OB
YENIS.
LENA-KOL.
CHUK.
AN.
OKH.
KAMCH.
UDA
SAKH.
ZE.-BU.
USS.
DAU.
ANG.-SAY.
ALT.
IRT.
AR.-CASP.
BALKH.
KARA K.
KYZ. K.
T. SH.
PAM.-AL.
1 2 3 4 5 6 8 9 10 11
Moscow
Leningrad
Helsinki
Tallin
Riga
Vilnyus
Minsk
Warsaw
Vienna
Budapest
Lvov
Kiev
Kishinev
Odessa
Kharkov
Tambov
Kazan
Saratov
Stalingrad
Sverdlovsk
Chelyabinsk
Omsk
Novosibirsk
Barnaul
Krasnoyarsk
Irkutsk
Ulan-Ude
Chita
Yakutsk
Khabarovsk
Vladivostok
Petropavlovsk
Tbilisi
Erevan
Baku
Astrakhan
Gur'ev
Ashkhabad
Teheran
Tashkent
Stalinabad
Frunze
Alma-Ata
Semipalatinsk
Karaganda
Tokyo
Volga
Don
Ob
Yenisei
Lena
Amur
Lower Tunguska
Podkamennaya Tunguska
Upper Tunguska
L. Baikal
L. Balkhash
Amu Darya
Syr-Darya
1 – CRIM.
2 – CISC.
3 – W. TRANSC.
4 – E. TRANSC.
5 – S. TRANSC.
6 – DAG.
7 – TAL.
8 – MTN. TURKM.
9 – AMU D.
10 – SYR D.
11 – DZU.-TARB.
200 0 200 400 600 800 1000 km
52 60 68 76 80 90 100 110 120 130 140 150 160 170 180
60 70 80 90 100 110 120 130
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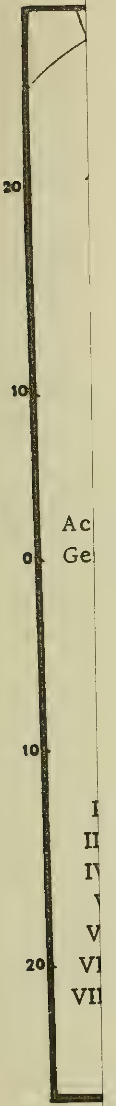
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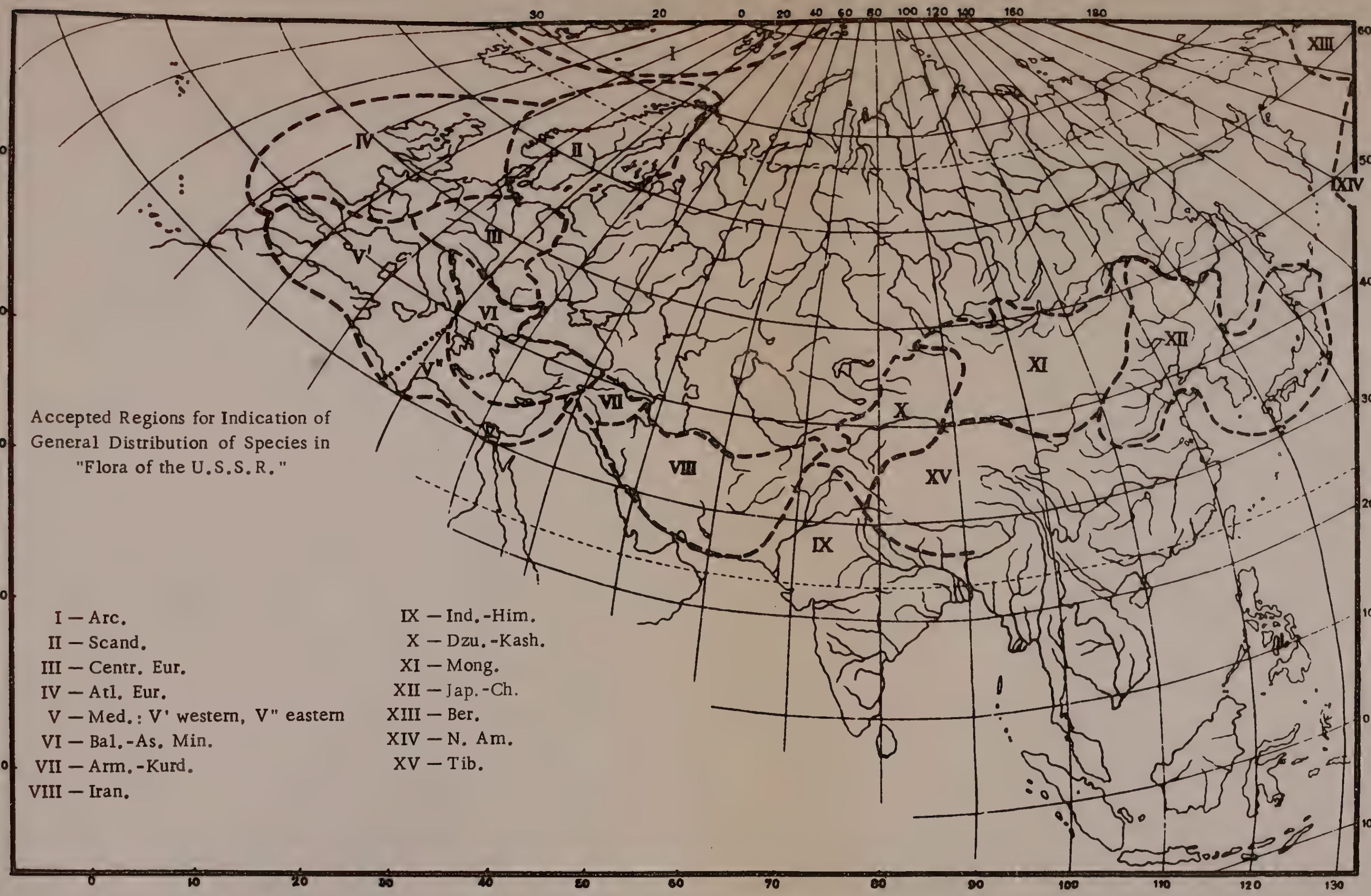

Accepted Regions for Indication of General Distribution of Species in "Flora of the U.S.S.R."

I — Arc.
II — Scand.
III — Centr. Eur.
IV — Atl. Eur.
V — Med.: V' western, V" eastern
VI — Bal.-As. Min.
VII — Arm.-Kurd.
VIII — Iran.
IX — Ind.-Him.
X — Dzu.-Kash.
XI — Mong.
XII — Jap.-Ch.
XIII — Ber.
XIV — N. Am.
XV — Tib.

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